US009066235B2

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Ujiie et al.

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(45) **Date of Patent: Jun. 23, 2015**

(54) **CONTROL SYSTEM AND SECURITY CONTROL METHOD**

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(73) Assignee: **PANASONIC INTELLECTUAL PROPERTY CORPORATION OF AMERICA**, Torrance, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 196 days.

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
G06F 21/31 (2013.01)
H04W 12/08 (2009.01)
H04L 29/06 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04W 12/08*** (2013.01); ***H04L 63/107*** (2013.01); ***H04W 4/206*** (2013.01); *H04W 84/005* (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/31
USPC 726/16
See application file for complete search history.

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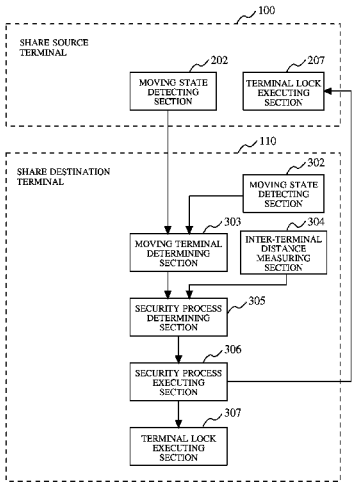
Primary Examiner — Kambiz Zand
Assistant Examiner — Thanh Le
(74) *Attorney, Agent, or Firm* — Wenderoth, Lind & Ponack, L.L.P.

(57) **ABSTRACT**

A moving state detecting section **202** determines a moving state of a share source terminal **100**. A moving state detecting section **302** determines a moving state of a share destination terminal **110**. An inter-terminal distance measuring section **304** detects the distance between the share source terminal **100** and the share destination terminal **110**. A security process determining section **305** determines a terminal and a function on which to perform a security process, based on the moving state of each terminal and the distance between the terminals. A security process executing section **306** notifies the determined terminal to perform the security process on the determined function.

15 Claims, 26 Drawing Sheets



(51) **Int. Cl.**
H04W 4/20 (2009.01)
H04W 84/00 (2009.01)

(56) **References Cited**

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FIG. 1

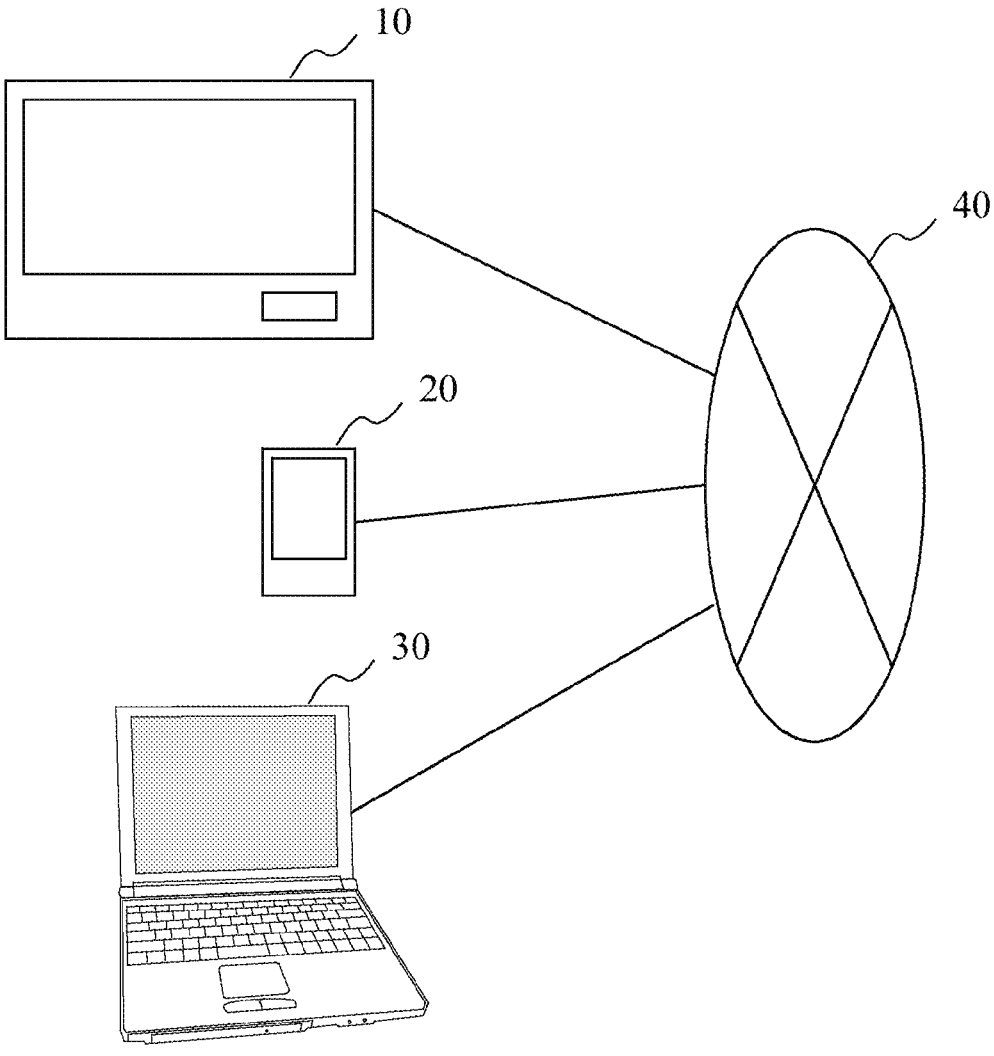
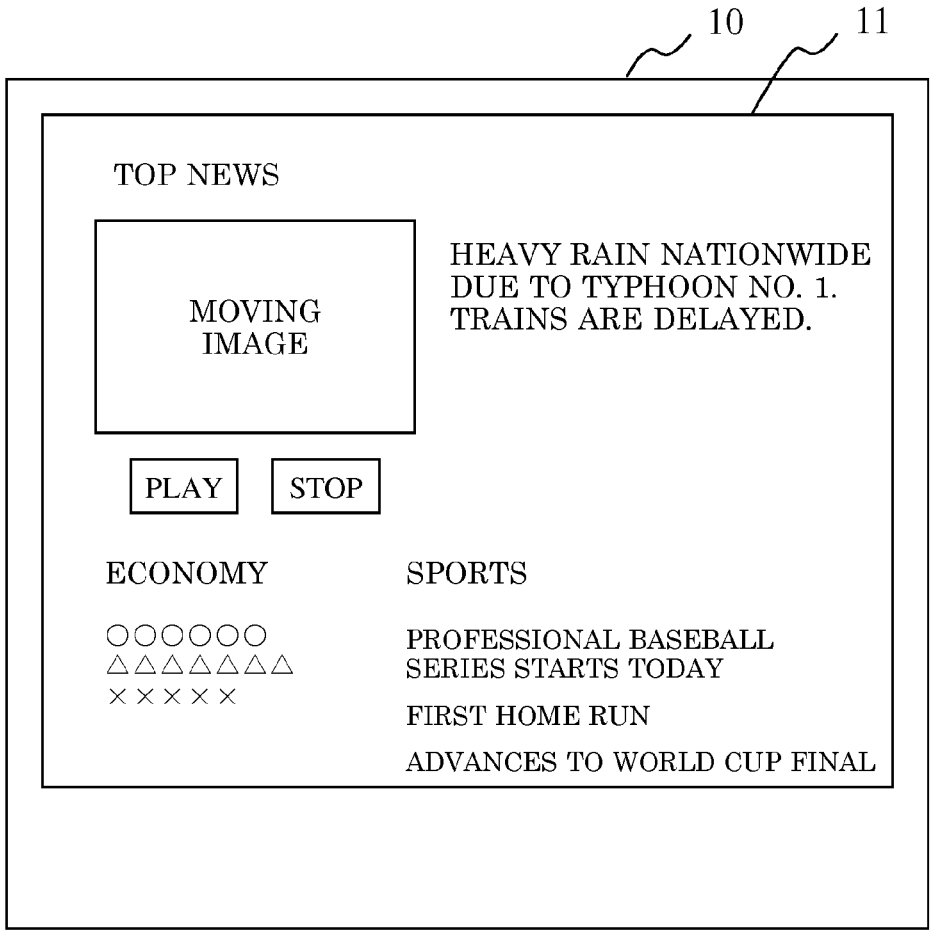


FIG. 2


10
11
TOP NEWS
MOVING IMAGE
HEAVY RAIN NATIONWIDE DUE TO TYPHOON NO. 1. TRAINS ARE DELAYED.
PLAY
STOP
ECONOMY
○○○○○○
△△△△△△△
×××××
SPORTS
PROFESSIONAL BASEBALL SERIES STARTS TODAY
FIRST HOME RUN
ADVANCES TO WORLD CUP FINAL

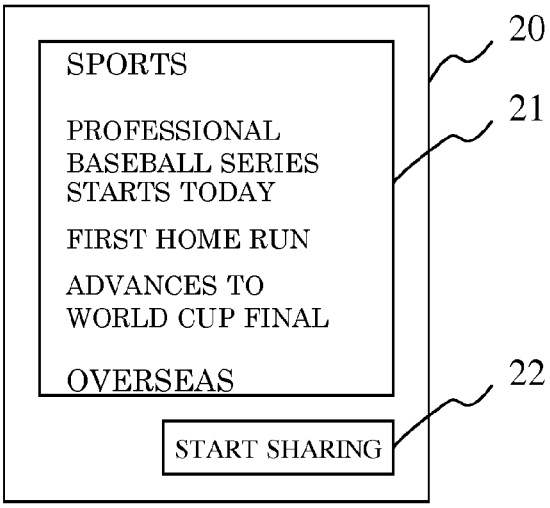

20
21
22
SPORTS
PROFESSIONAL BASEBALL SERIES STARTS TODAY
FIRST HOME RUN
ADVANCES TO WORLD CUP FINAL
OVERSEAS
START SHARING

FIG. 3

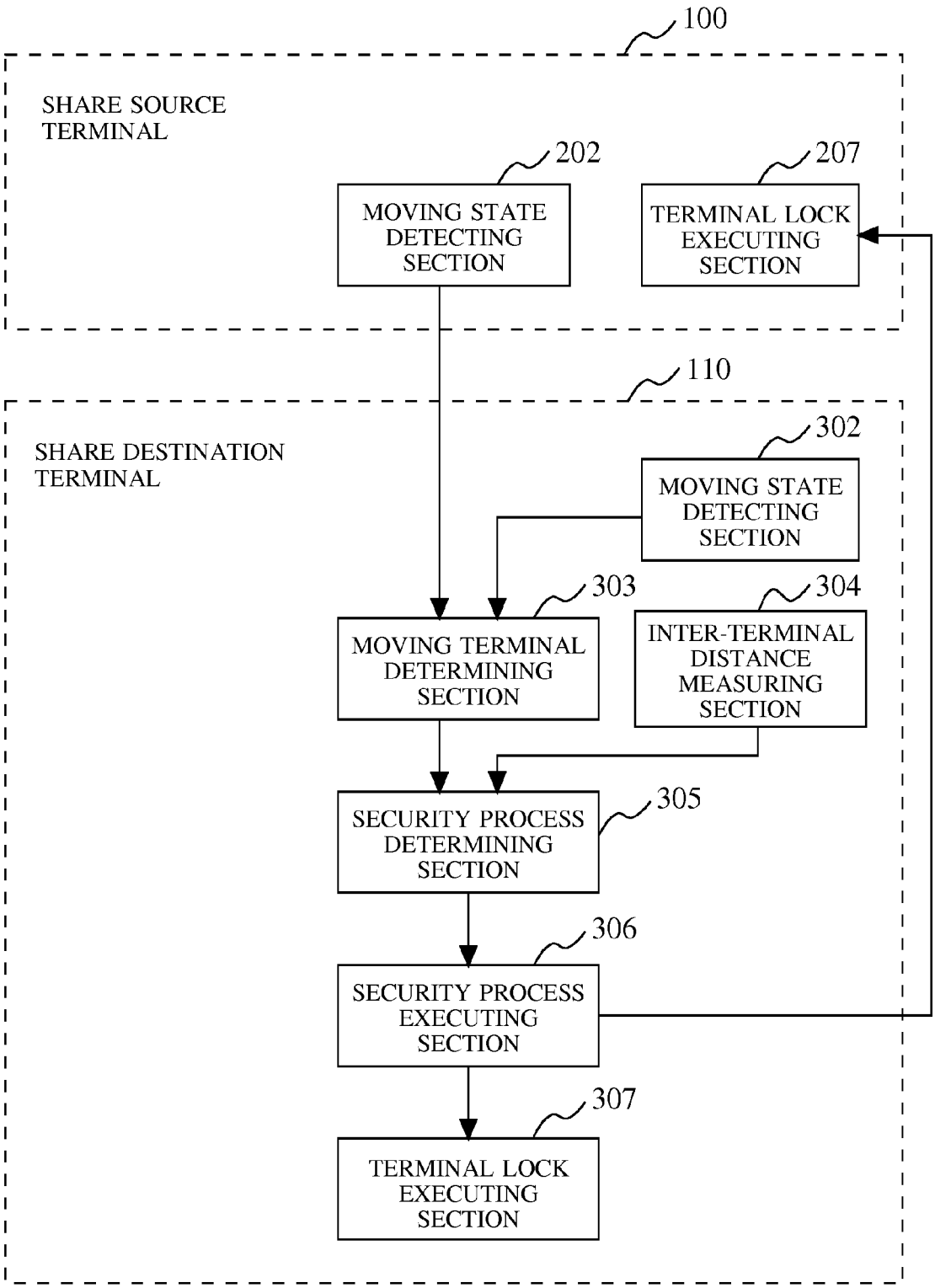

100
SHARE SOURCE TERMINAL
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
110
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
304
INTER-TERMINAL DISTANCE MEASURING SECTION
305
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
307
TERMINAL LOCK EXECUTING SECTION

FIG. 4A

400

MOVEMENT INFORMATION A	
TIME [ms]	TERMINAL STATE
30	STATIONARY
60	STATIONARY
90	MOVING
120	MOVING
150	STATIONARY
180	STATIONARY

401

FIG. 4B

402

MOVEMENT INFORMATION B	
TIME [ms]	TERMINAL STATE
30	STATIONARY
60	STATIONARY
90	STATIONARY
120	MOVING
150	MOVING
180	MOVING

403

FIG. 5

502

500

503

MOVING TERMINAL INFORMATION		
TIME [ms]	THE NUMBER OF MOVING TERMINALS	MOVING TERMINAL TYPE
30	0	–
60	0	–
90	1	SHARE SOURCE TERMINAL
120	2	SHARE DESTINATION TERMINAL SHARE SOURCE TERMINAL
150	1	SHARE DESTINATION TERMINAL
180	1	SHARE DESTINATION TERMINAL

FIG. 6

700

701

INTER-TERMINAL DISTANCE INFORMATION	
TIME [ms]	INTER-TERMINAL DISTANCE [cm]
30	30
60	30
90	180
120	280
150	550
180	800

FIG. 7

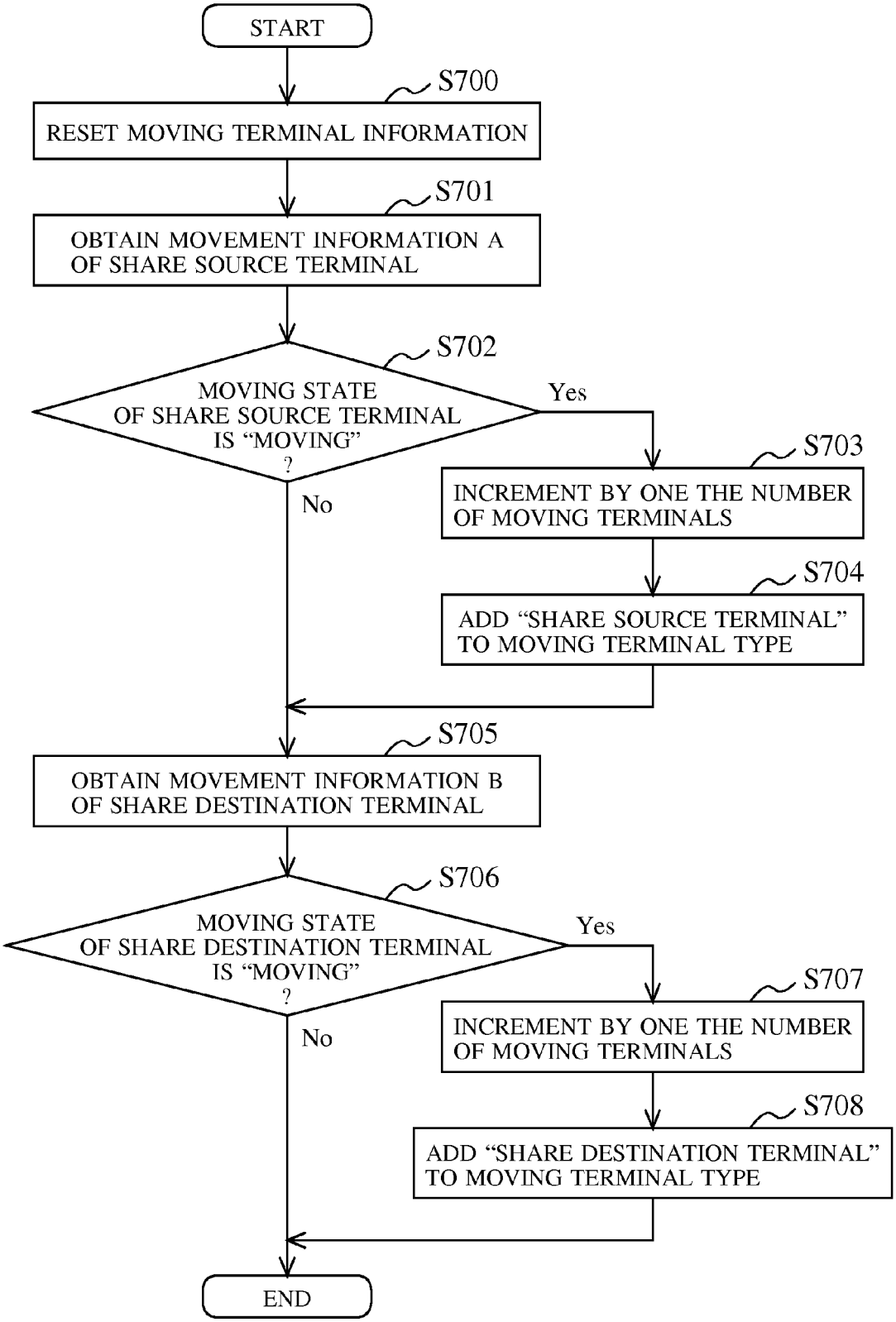

START
S700
RESET MOVING TERMINAL INFORMATION
S701
OBTAIN MOVEMENT INFORMATION A OF SHARE SOURCE TERMINAL
S702
MOVING STATE OF SHARE SOURCE TERMINAL IS "MOVING" ?
Yes
No
S703
INCREMENT BY ONE THE NUMBER OF MOVING TERMINALS
S704
ADD "SHARE SOURCE TERMINAL" TO MOVING TERMINAL TYPE
S705
OBTAIN MOVEMENT INFORMATION B OF SHARE DESTINATION TERMINAL
S706
MOVING STATE OF SHARE DESTINATION TERMINAL IS "MOVING" ?
Yes
No
S707
INCREMENT BY ONE THE NUMBER OF MOVING TERMINALS
S708
ADD "SHARE DESTINATION TERMINAL" TO MOVING TERMINAL TYPE
END

FIG. 8

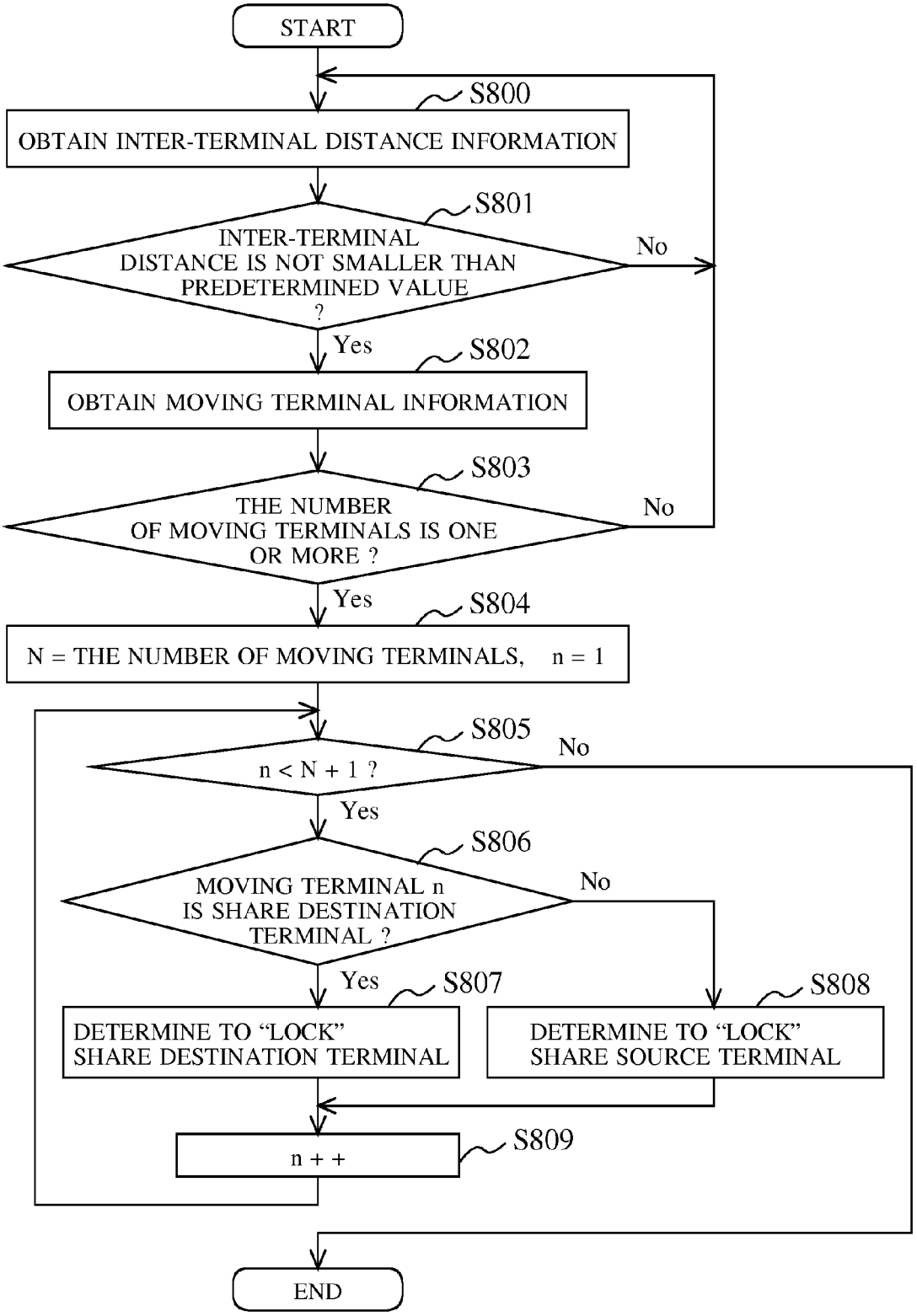

START
S800
OBTAIN INTER-TERMINAL DISTANCE INFORMATION
S801
INTER-TERMINAL DISTANCE IS NOT SMALLER THAN PREDETERMINED VALUE ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S806
MOVING TERMINAL n IS SHARE DESTINATION TERMINAL ?
No
Yes
S807
DETERMINE TO "LOCK" SHARE DESTINATION TERMINAL
S808
DETERMINE TO "LOCK" SHARE SOURCE TERMINAL
S809
n + +
END

FIG. 9

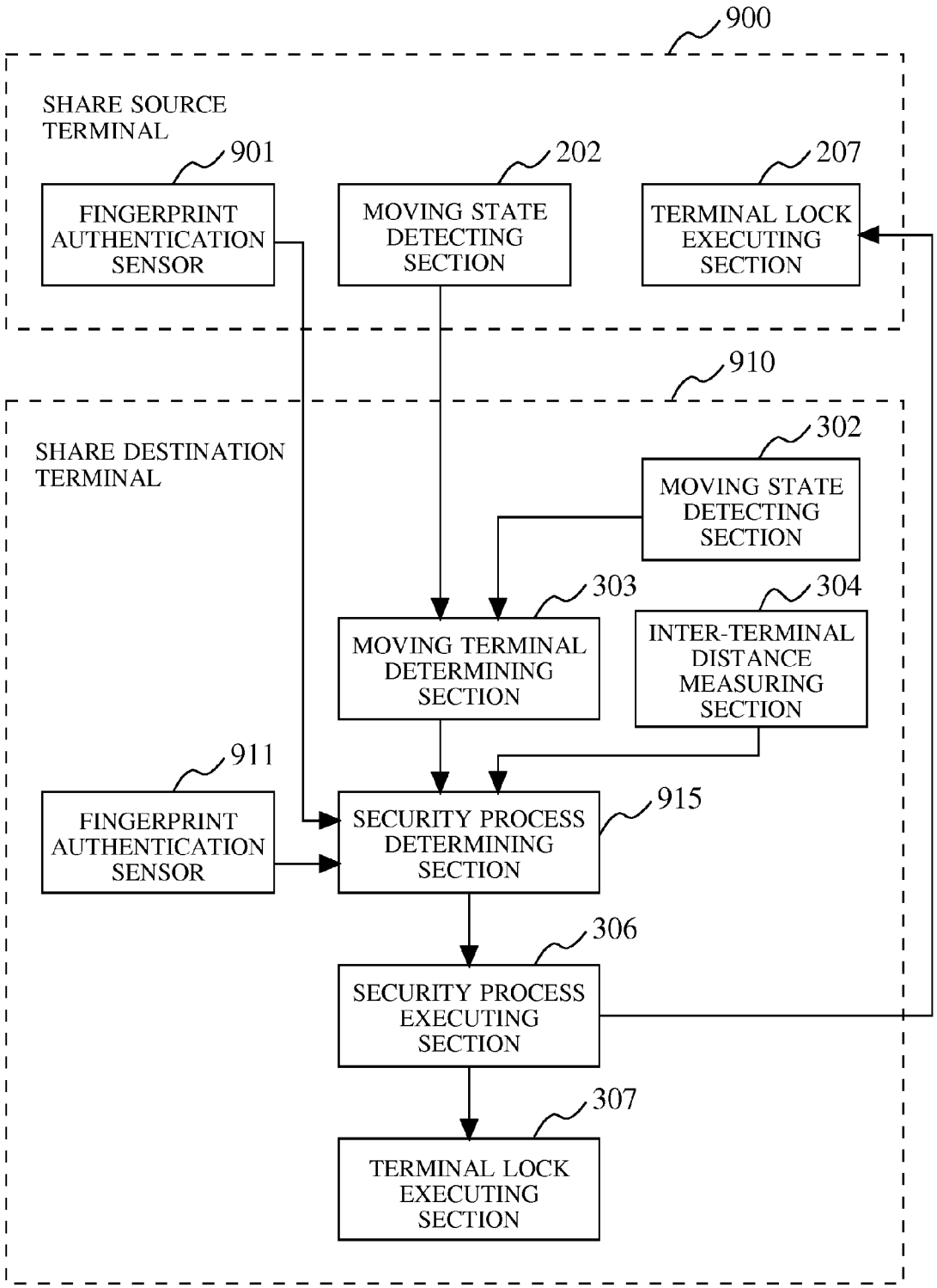

900
SHARE SOURCE TERMINAL
901
FINGERPRINT AUTHENTICATION SENSOR
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
910
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
304
INTER-TERMINAL DISTANCE MEASURING SECTION
911
FINGERPRINT AUTHENTICATION SENSOR
915
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
307
TERMINAL LOCK EXECUTING SECTION

FIG. 10

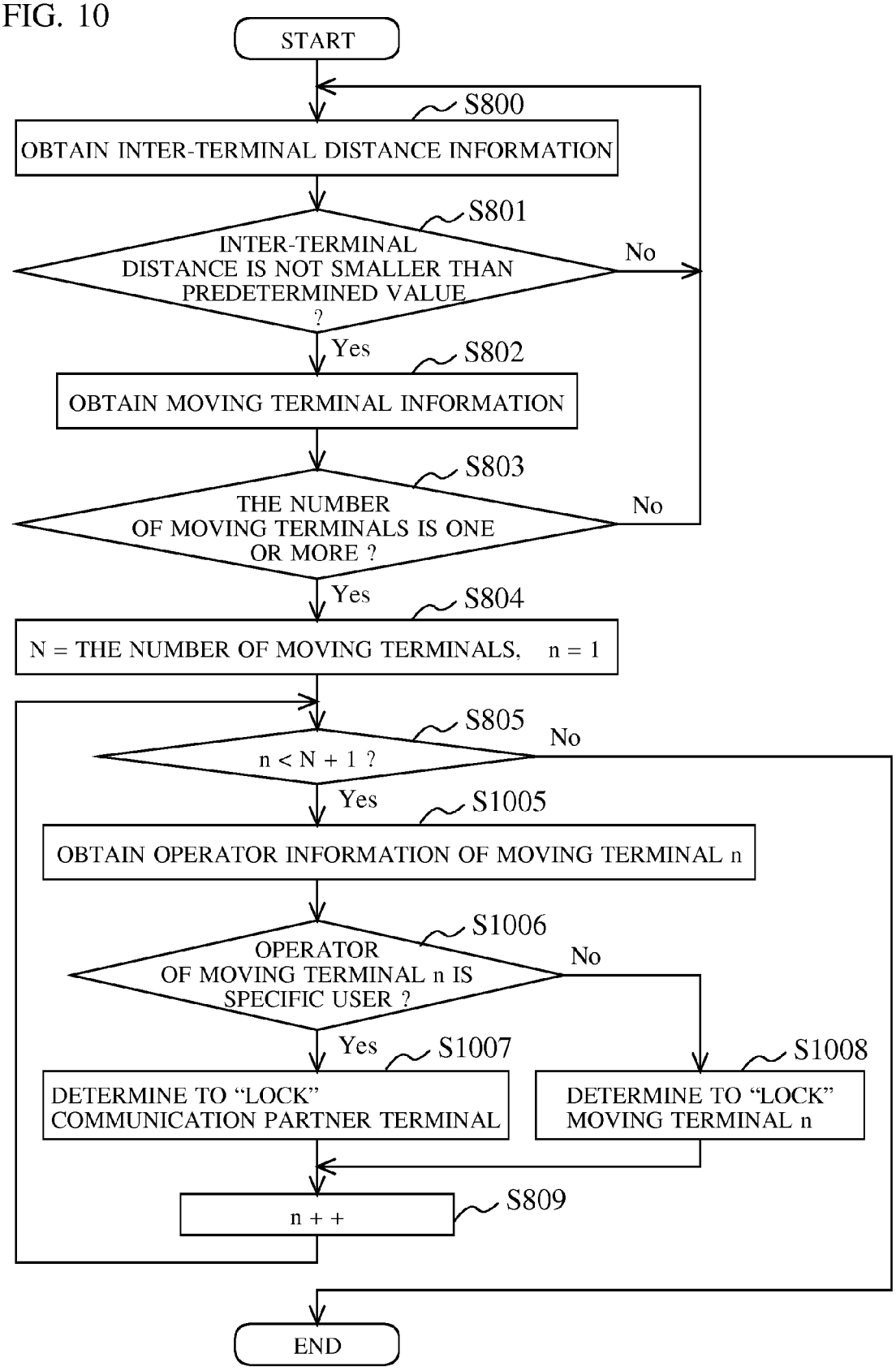

START
S800
OBTAIN INTER-TERMINAL DISTANCE INFORMATION
S801
INTER-TERMINAL DISTANCE IS NOT SMALLER THAN PREDETERMINED VALUE ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S1005
OBTAIN OPERATOR INFORMATION OF MOVING TERMINAL n
S1006
OPERATOR OF MOVING TERMINAL n IS SPECIFIC USER ?
No
Yes
S1007
DETERMINE TO "LOCK" COMMUNICATION PARTNER TERMINAL
S1008
DETERMINE TO "LOCK" MOVING TERMINAL n
n + +
S809
END

FIG. 11

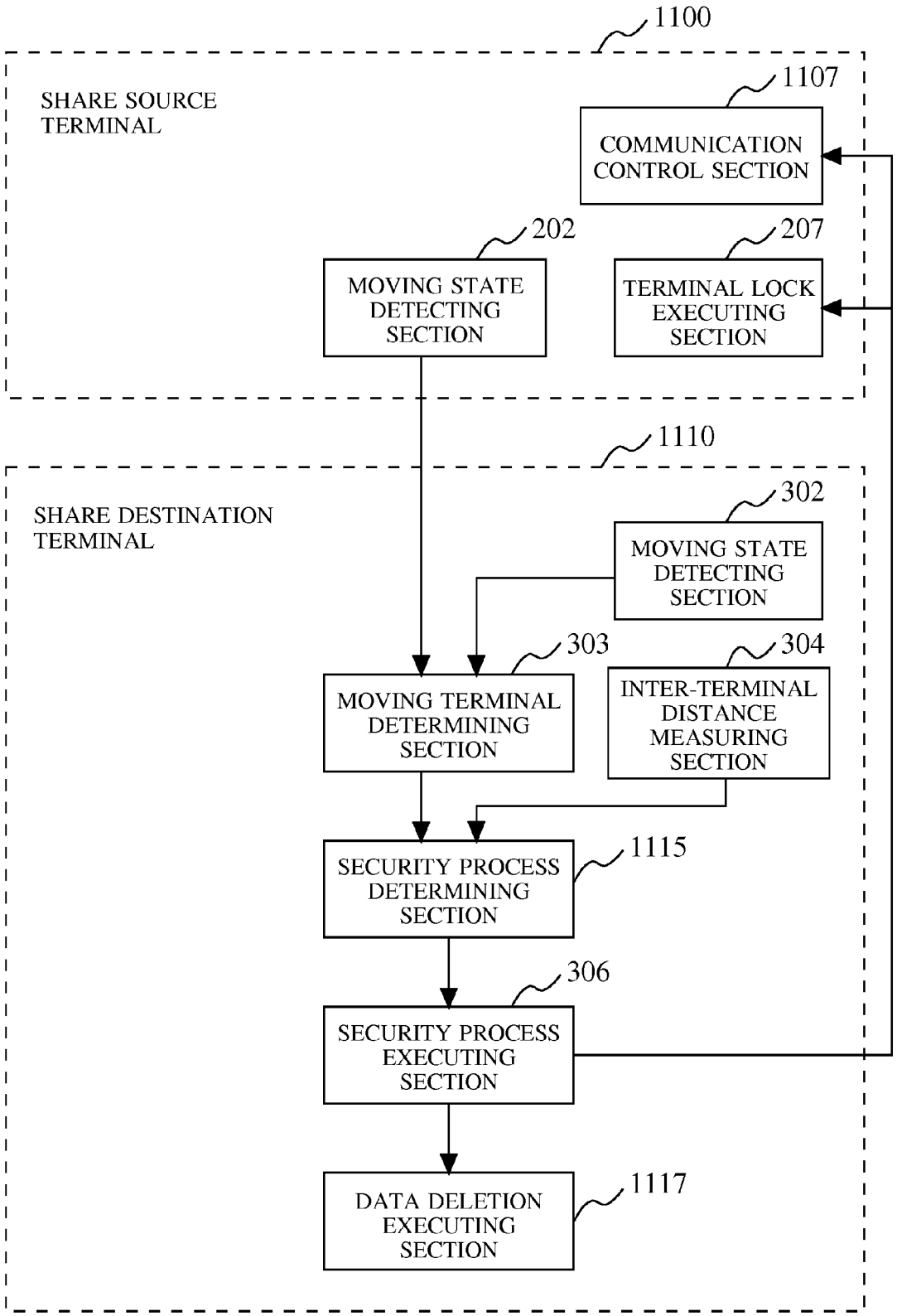

1100
SHARE SOURCE TERMINAL
1107
COMMUNICATION CONTROL SECTION
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
1110
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
304
INTER-TERMINAL DISTANCE MEASURING SECTION
1115
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
1117
DATA DELETION EXECUTING SECTION

FIG. 12

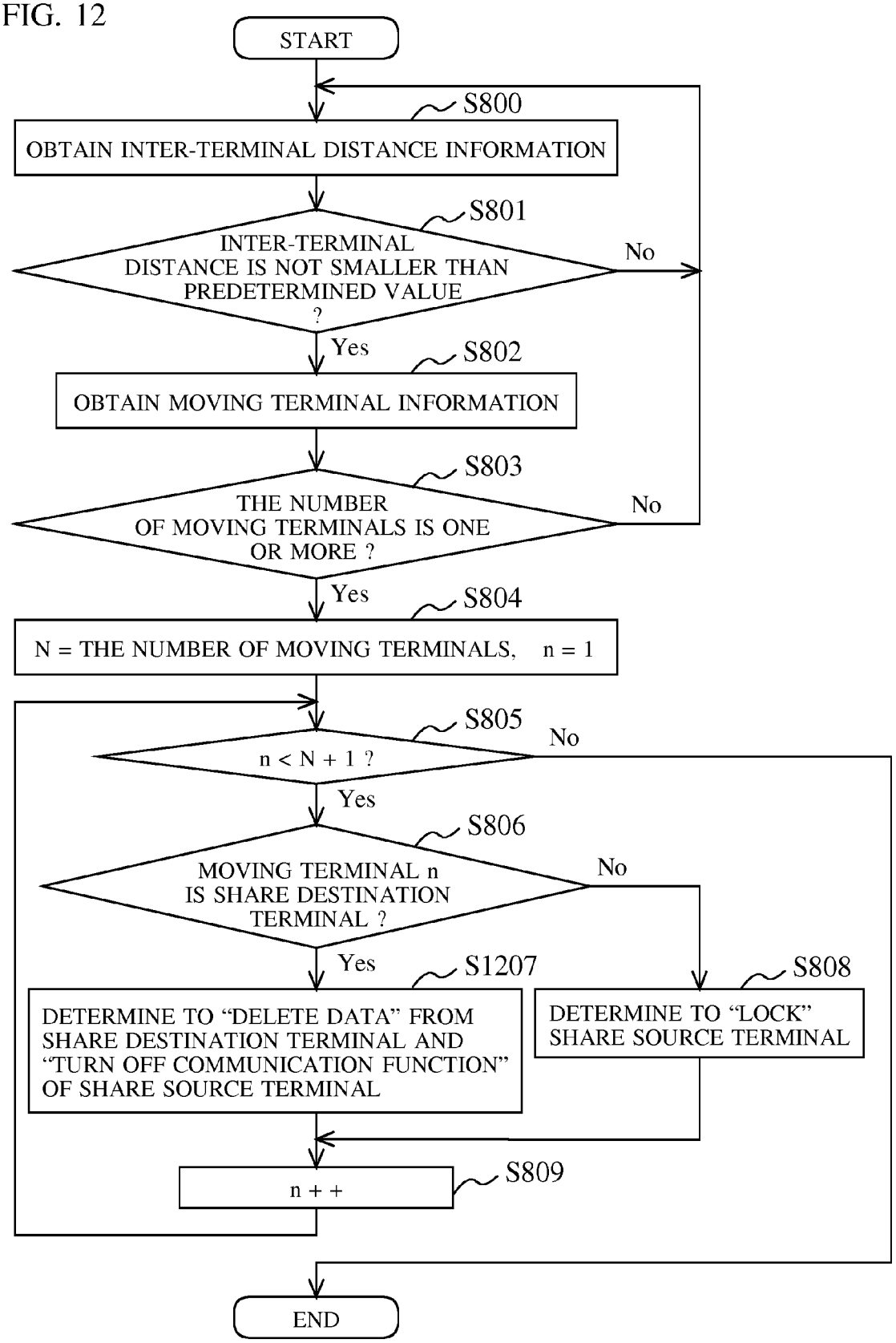

START
S800
OBTAIN INTER-TERMINAL DISTANCE INFORMATION
S801
INTER-TERMINAL DISTANCE IS NOT SMALLER THAN PREDETERMINED VALUE ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S806
MOVING TERMINAL n IS SHARE DESTINATION TERMINAL ?
No
Yes
S1207
DETERMINE TO "DELETE DATA" FROM SHARE DESTINATION TERMINAL AND "TURN OFF COMMUNICATION FUNCTION" OF SHARE SOURCE TERMINAL
S808
DETERMINE TO "LOCK" SHARE SOURCE TERMINAL
S809
n + +
END

FIG. 13

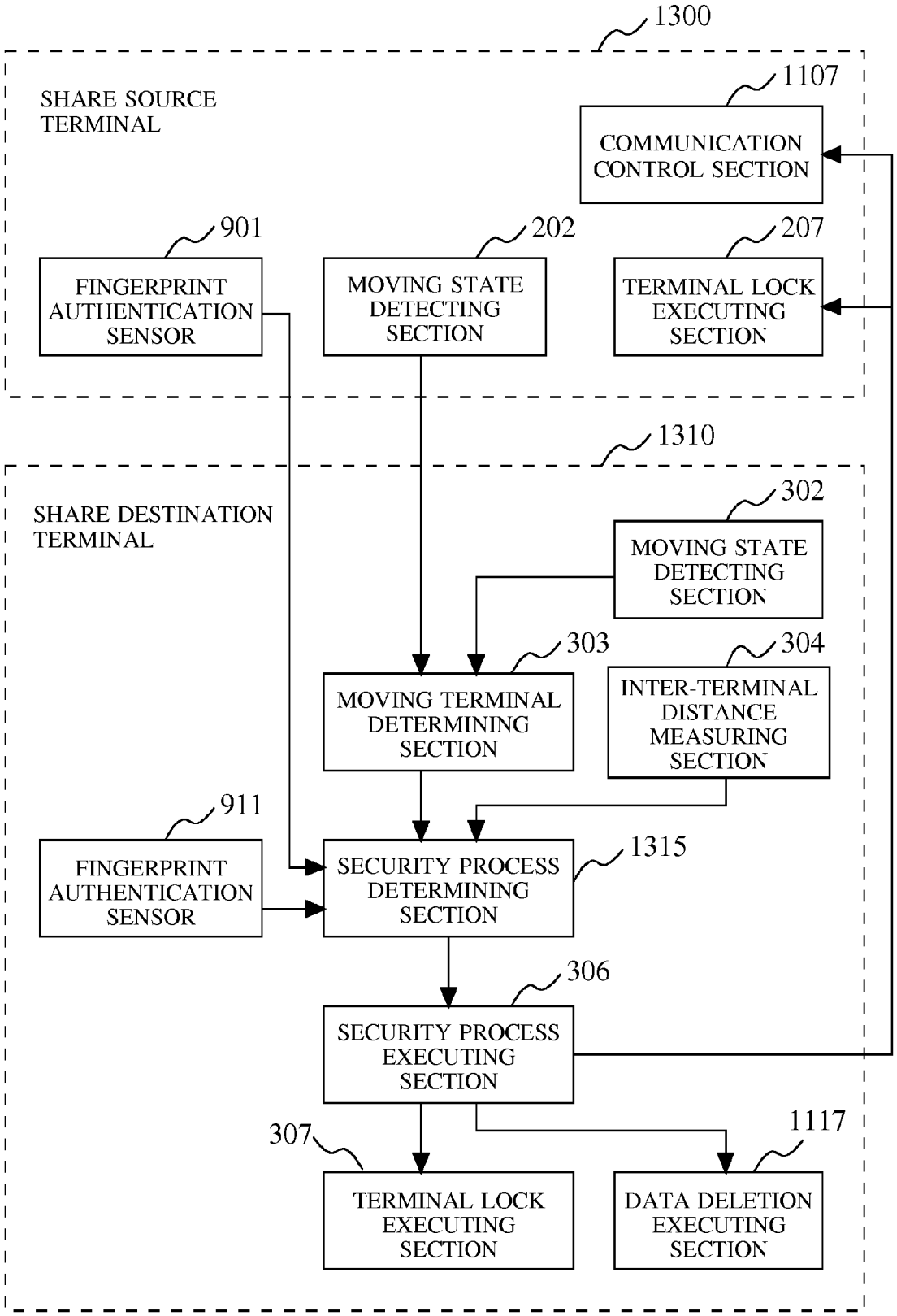

1300
SHARE SOURCE TERMINAL
1107
COMMUNICATION CONTROL SECTION
901
FINGERPRINT AUTHENTICATION SENSOR
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
1310
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
304
INTER-TERMINAL DISTANCE MEASURING SECTION
911
FINGERPRINT AUTHENTICATION SENSOR
1315
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
307
TERMINAL LOCK EXECUTING SECTION
1117
DATA DELETION EXECUTING SECTION

FIG. 14

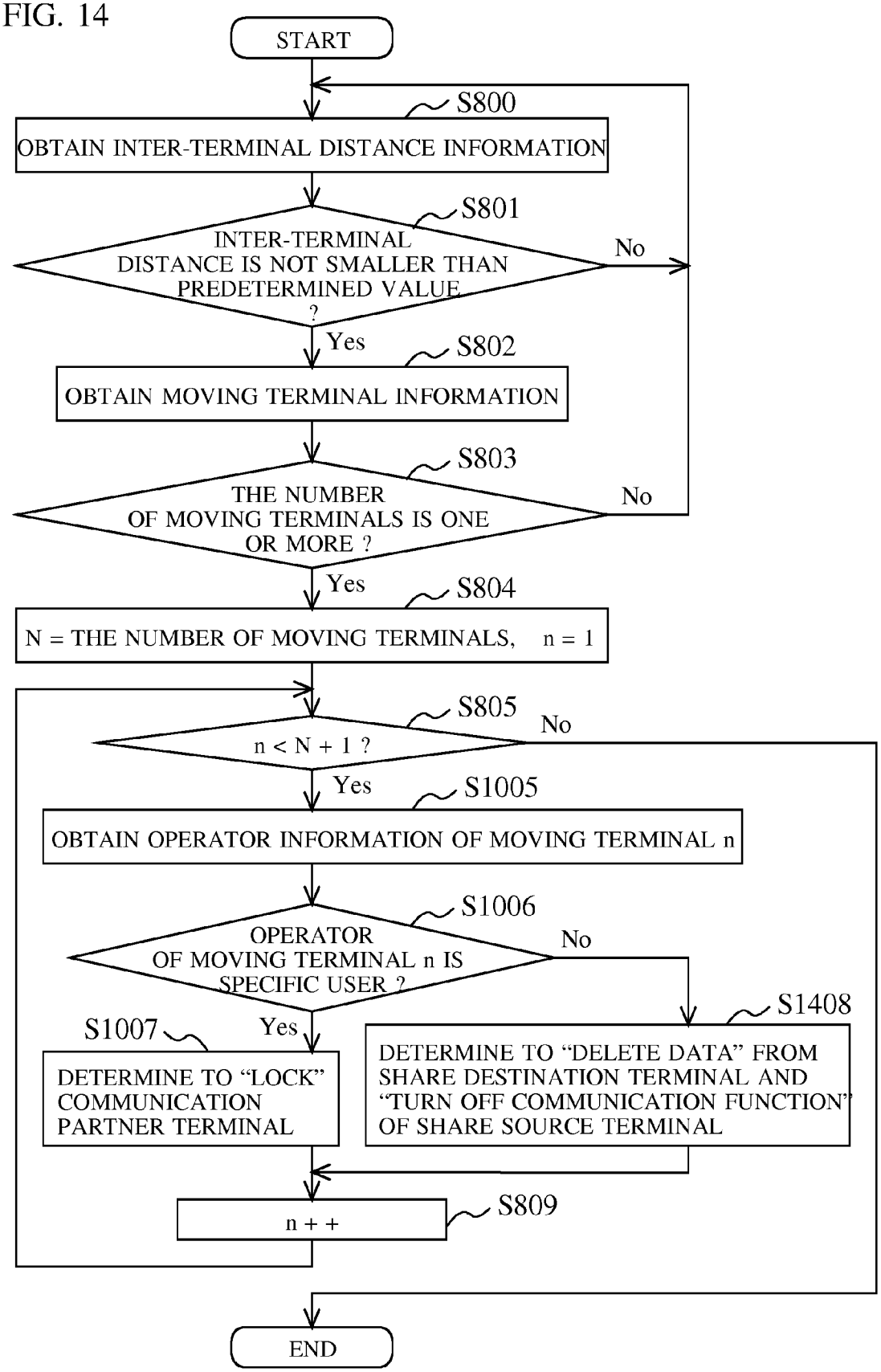

START
S800
OBTAIN INTER-TERMINAL DISTANCE INFORMATION
S801
INTER-TERMINAL DISTANCE IS NOT SMALLER THAN PREDETERMINED VALUE ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S1005
OBTAIN OPERATOR INFORMATION OF MOVING TERMINAL n
S1006
OPERATOR OF MOVING TERMINAL n IS SPECIFIC USER ?
No
Yes
S1007
DETERMINE TO "LOCK" COMMUNICATION PARTNER TERMINAL
S1408
DETERMINE TO "DELETE DATA" FROM SHARE DESTINATION TERMINAL AND "TURN OFF COMMUNICATION FUNCTION" OF SHARE SOURCE TERMINAL
n + +
S809
END

FIG. 15

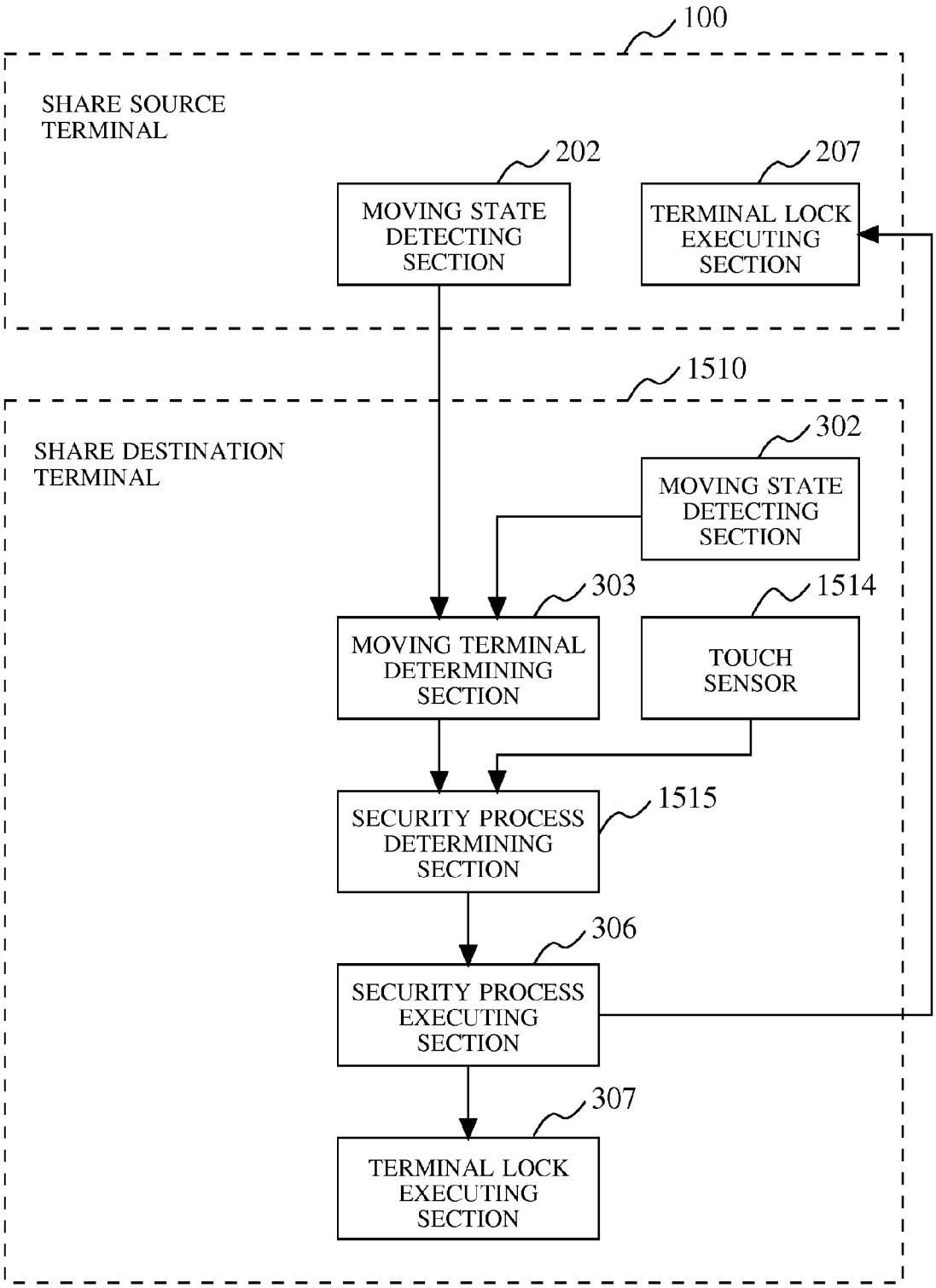

100
SHARE SOURCE TERMINAL
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
1510
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
1514
TOUCH SENSOR
1515
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
307
TERMINAL LOCK EXECUTING SECTION

FIG. 16

1600

OPERATION INFORMATION	
TIME [ms]	OPERATION
30	PERFORMED
60	NOT PERFORMED
90	NOT PERFORMED
120	NOT PERFORMED
150	NOT PERFORMED
180	NOT PERFORMED

1601

FIG. 17

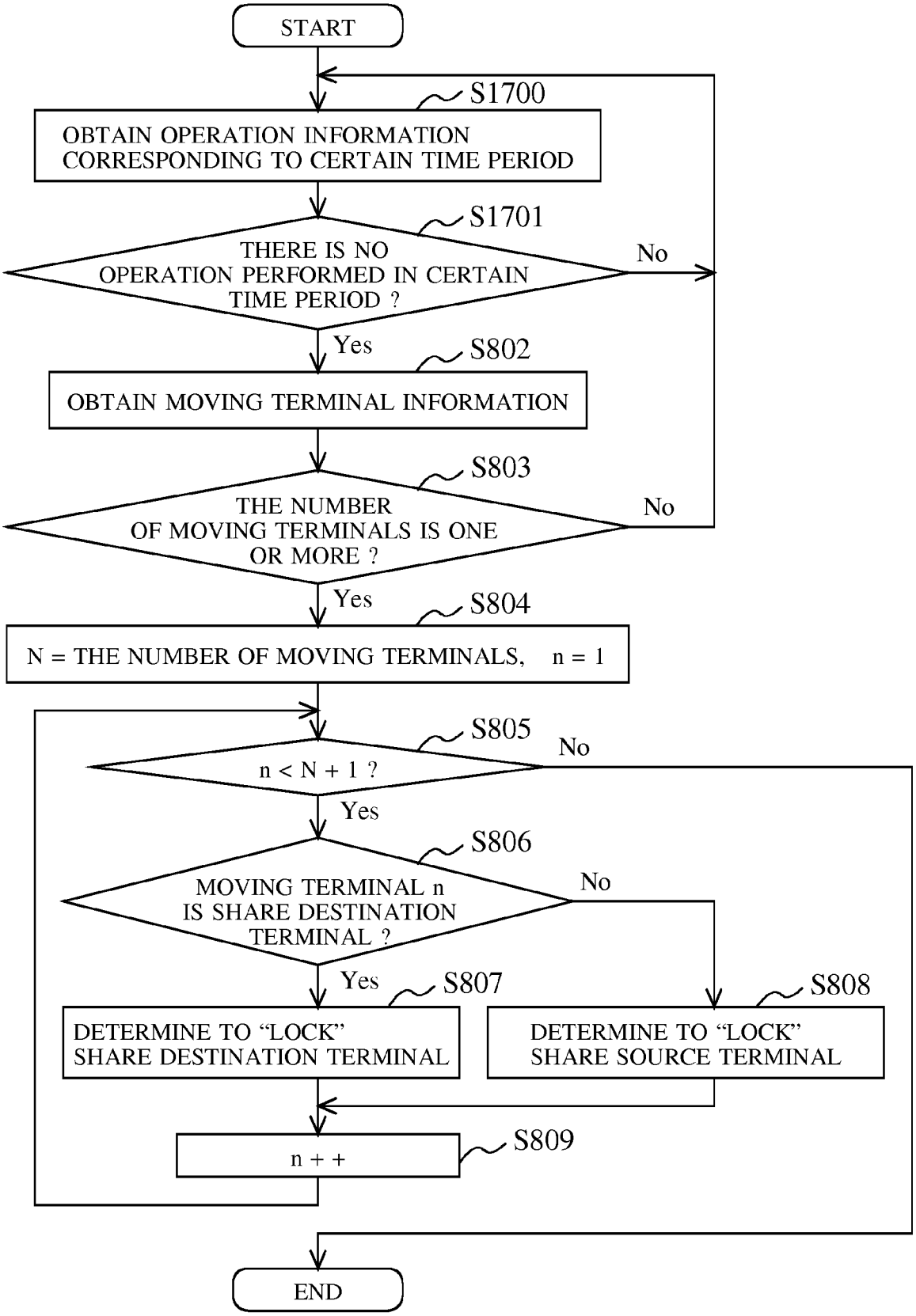

START
S1700
OBTAIN OPERATION INFORMATION CORRESPONDING TO CERTAIN TIME PERIOD
S1701
THERE IS NO OPERATION PERFORMED IN CERTAIN TIME PERIOD ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S806
MOVING TERMINAL n IS SHARE DESTINATION TERMINAL ?
No
Yes
S807
DETERMINE TO "LOCK" SHARE DESTINATION TERMINAL
S808
DETERMINE TO "LOCK" SHARE SOURCE TERMINAL
n + +
S809
END

FIG. 18

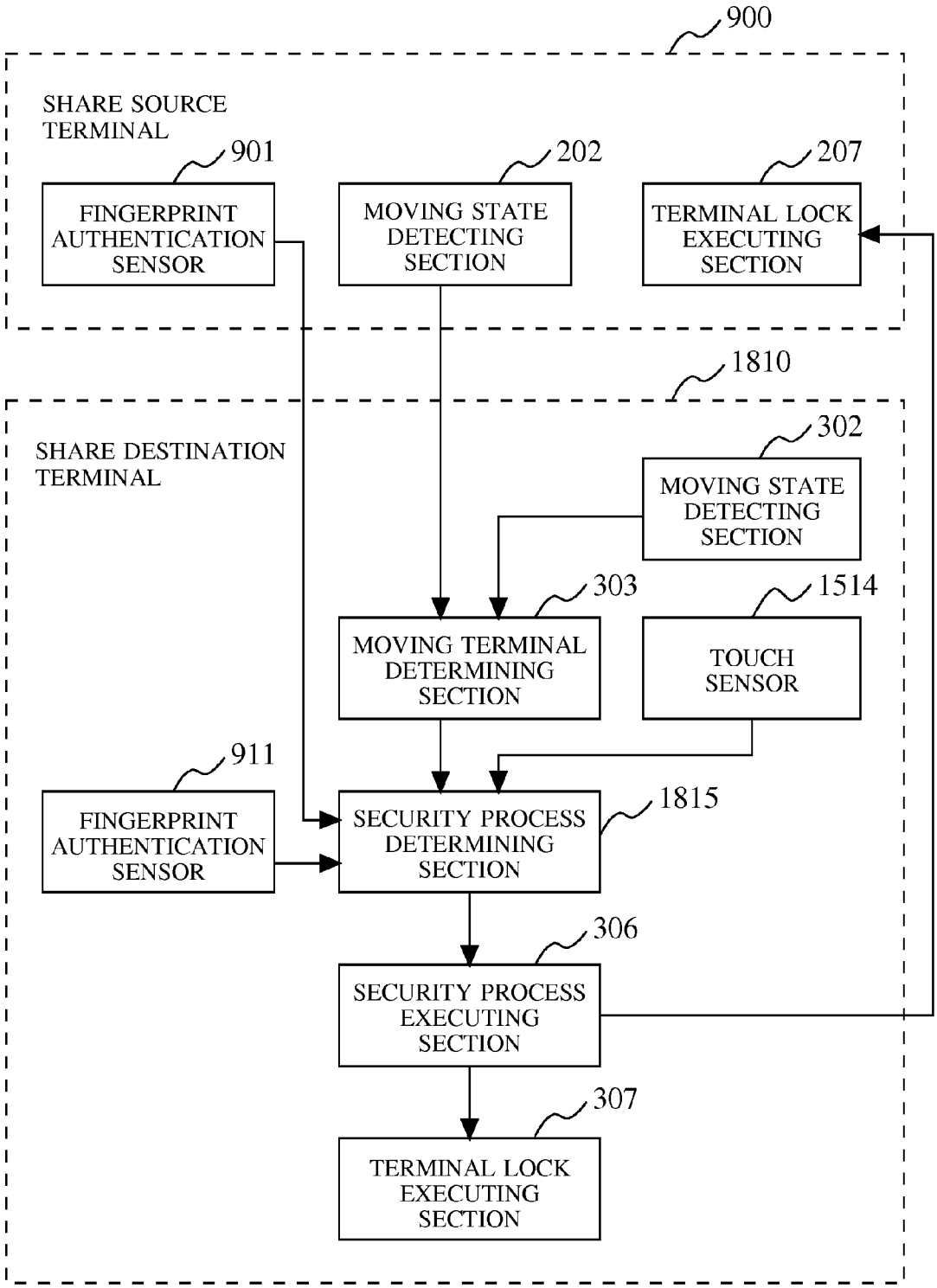

900
SHARE SOURCE TERMINAL
901
FINGERPRINT AUTHENTICATION SENSOR
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
1810
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
1514
TOUCH SENSOR
911
FINGERPRINT AUTHENTICATION SENSOR
1815
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
307
TERMINAL LOCK EXECUTING SECTION

FIG. 19

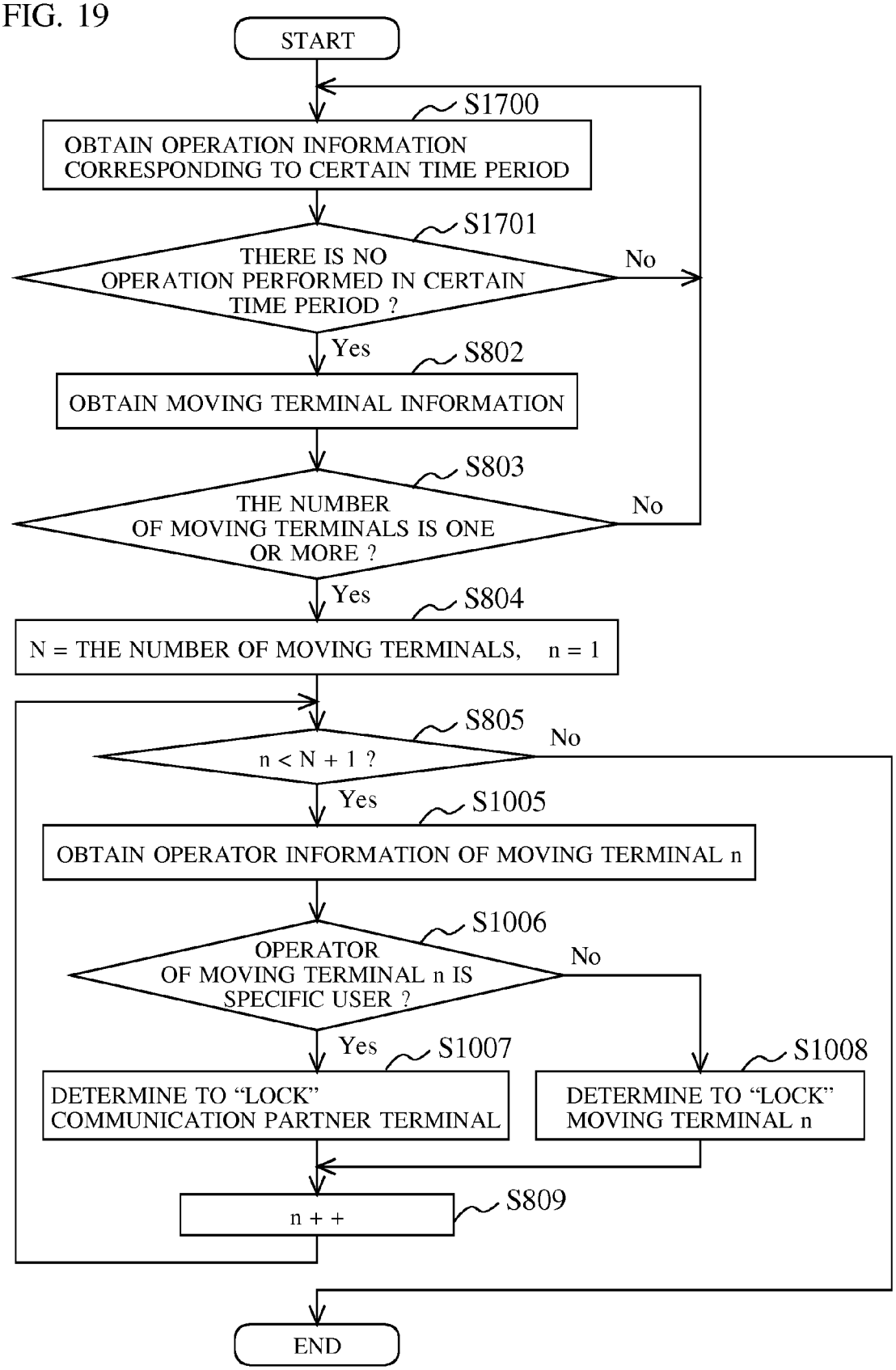

START
S1700
OBTAIN OPERATION INFORMATION CORRESPONDING TO CERTAIN TIME PERIOD
S1701
THERE IS NO OPERATION PERFORMED IN CERTAIN TIME PERIOD ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S1005
OBTAIN OPERATOR INFORMATION OF MOVING TERMINAL n
S1006
OPERATOR OF MOVING TERMINAL n IS SPECIFIC USER ?
No
Yes
S1007
DETERMINE TO "LOCK" COMMUNICATION PARTNER TERMINAL
S1008
DETERMINE TO "LOCK" MOVING TERMINAL n
n + +
S809
END

FIG. 20

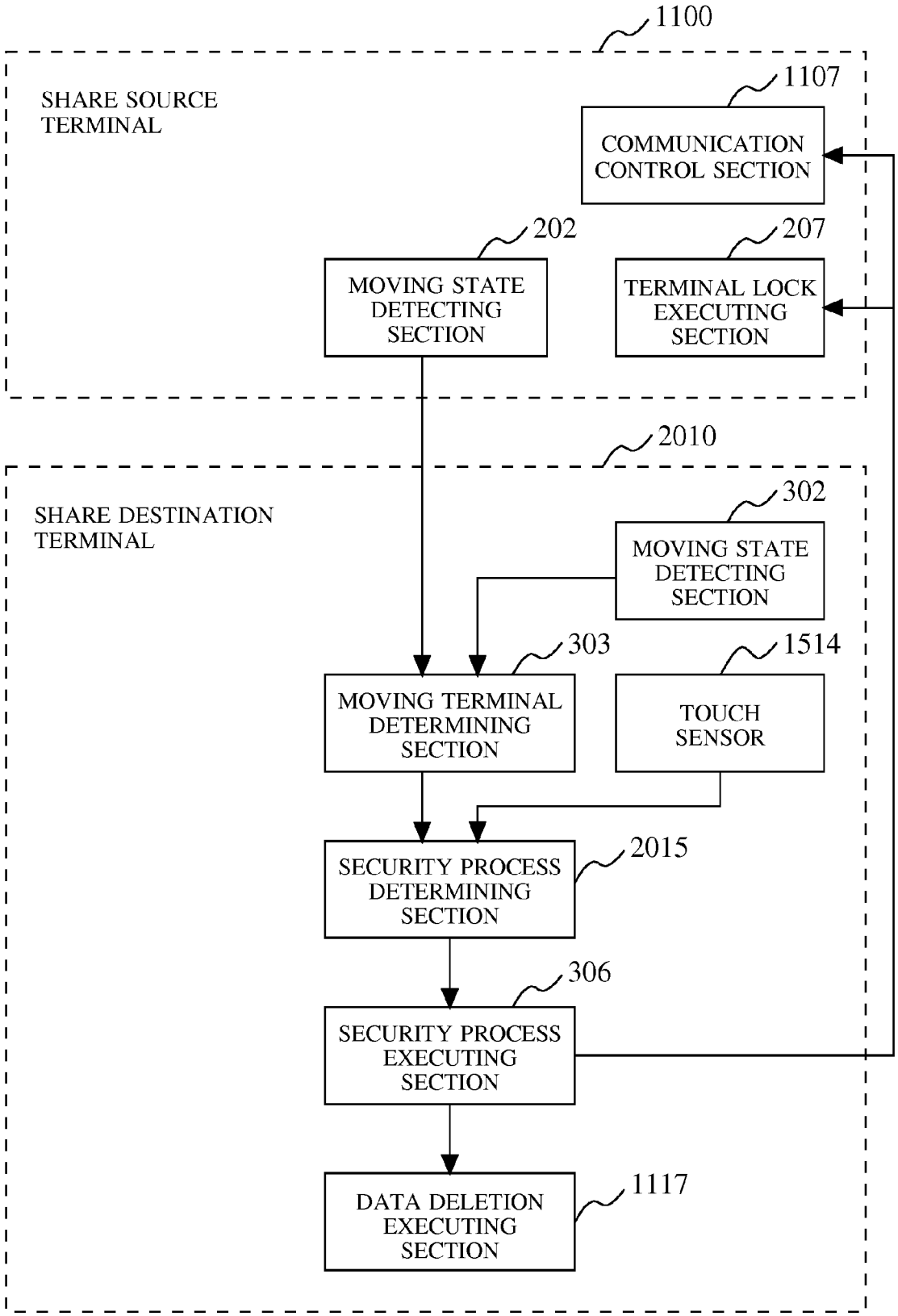

1100
SHARE SOURCE TERMINAL
1107
COMMUNICATION CONTROL SECTION
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
2010
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
1514
TOUCH SENSOR
2015
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
1117
DATA DELETION EXECUTING SECTION

FIG. 21

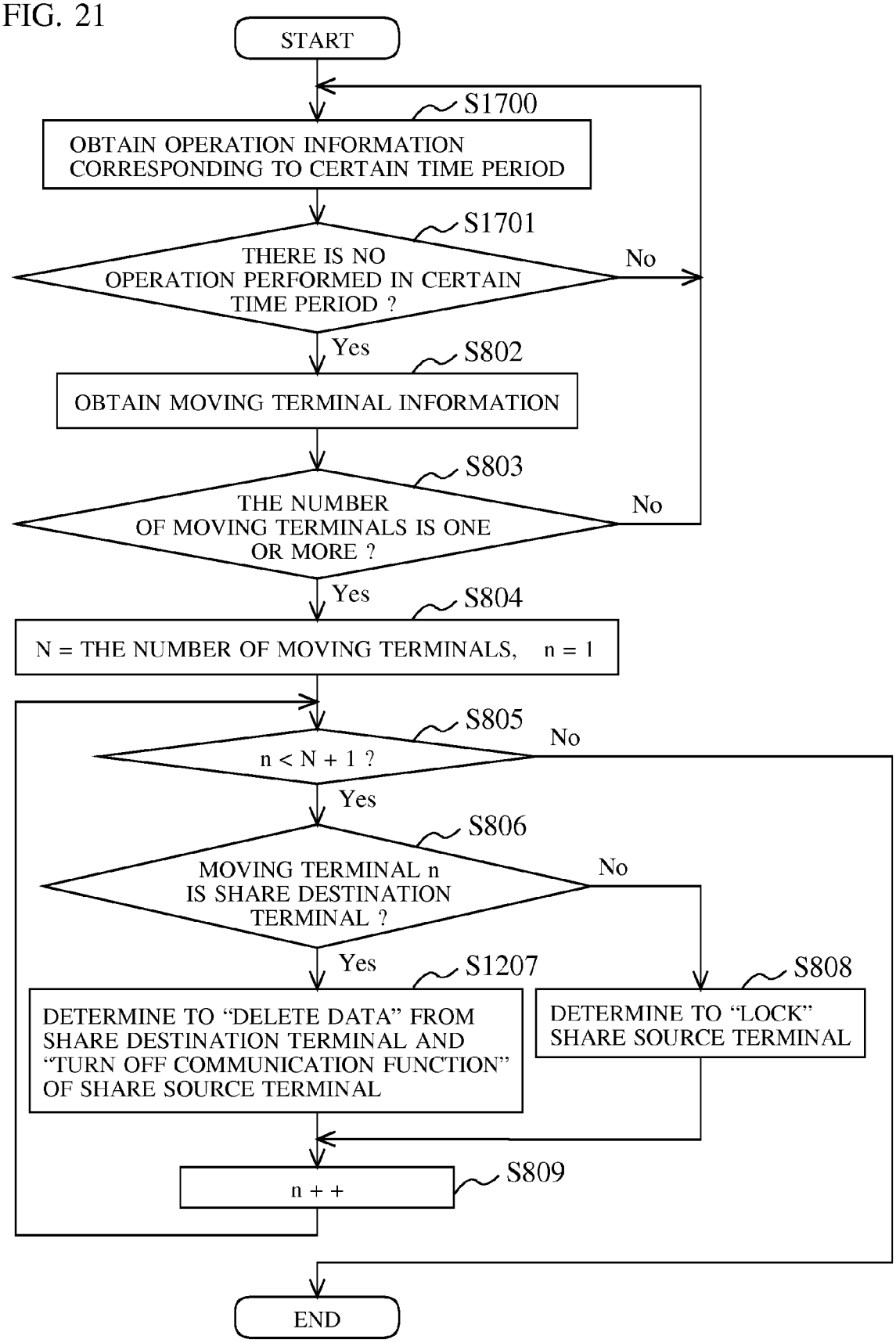

START
S1700
OBTAIN OPERATION INFORMATION CORRESPONDING TO CERTAIN TIME PERIOD
S1701
THERE IS NO OPERATION PERFORMED IN CERTAIN TIME PERIOD ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S806
MOVING TERMINAL n IS SHARE DESTINATION TERMINAL ?
No
Yes
S1207
DETERMINE TO "DELETE DATA" FROM SHARE DESTINATION TERMINAL AND "TURN OFF COMMUNICATION FUNCTION" OF SHARE SOURCE TERMINAL
S808
DETERMINE TO "LOCK" SHARE SOURCE TERMINAL
n + +
S809
END

FIG. 22

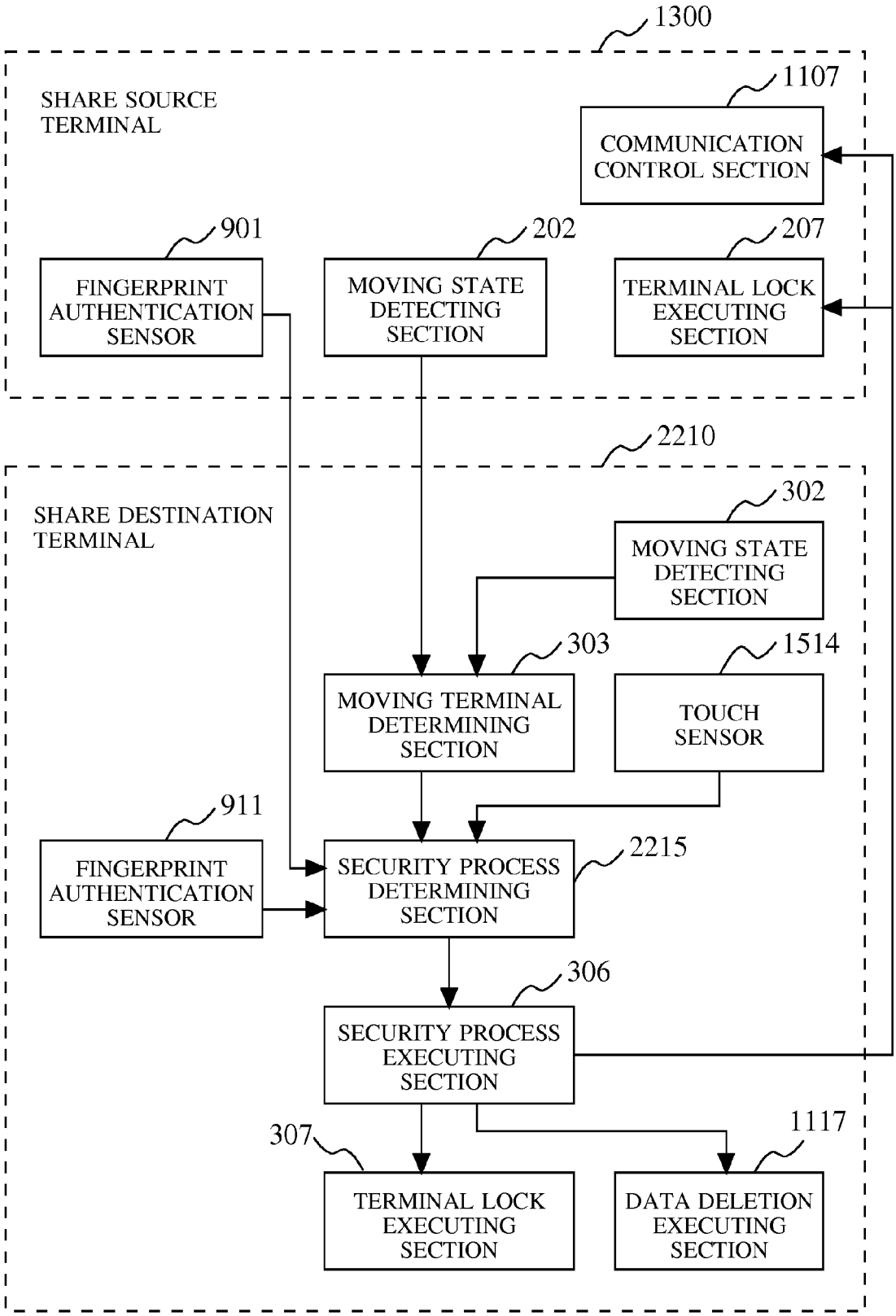

1300
SHARE SOURCE TERMINAL
1107
COMMUNICATION CONTROL SECTION
901
FINGERPRINT AUTHENTICATION SENSOR
202
MOVING STATE DETECTING SECTION
207
TERMINAL LOCK EXECUTING SECTION
2210
SHARE DESTINATION TERMINAL
302
MOVING STATE DETECTING SECTION
303
MOVING TERMINAL DETERMINING SECTION
1514
TOUCH SENSOR
911
FINGERPRINT AUTHENTICATION SENSOR
2215
SECURITY PROCESS DETERMINING SECTION
306
SECURITY PROCESS EXECUTING SECTION
307
TERMINAL LOCK EXECUTING SECTION
1117
DATA DELETION EXECUTING SECTION

FIG. 23

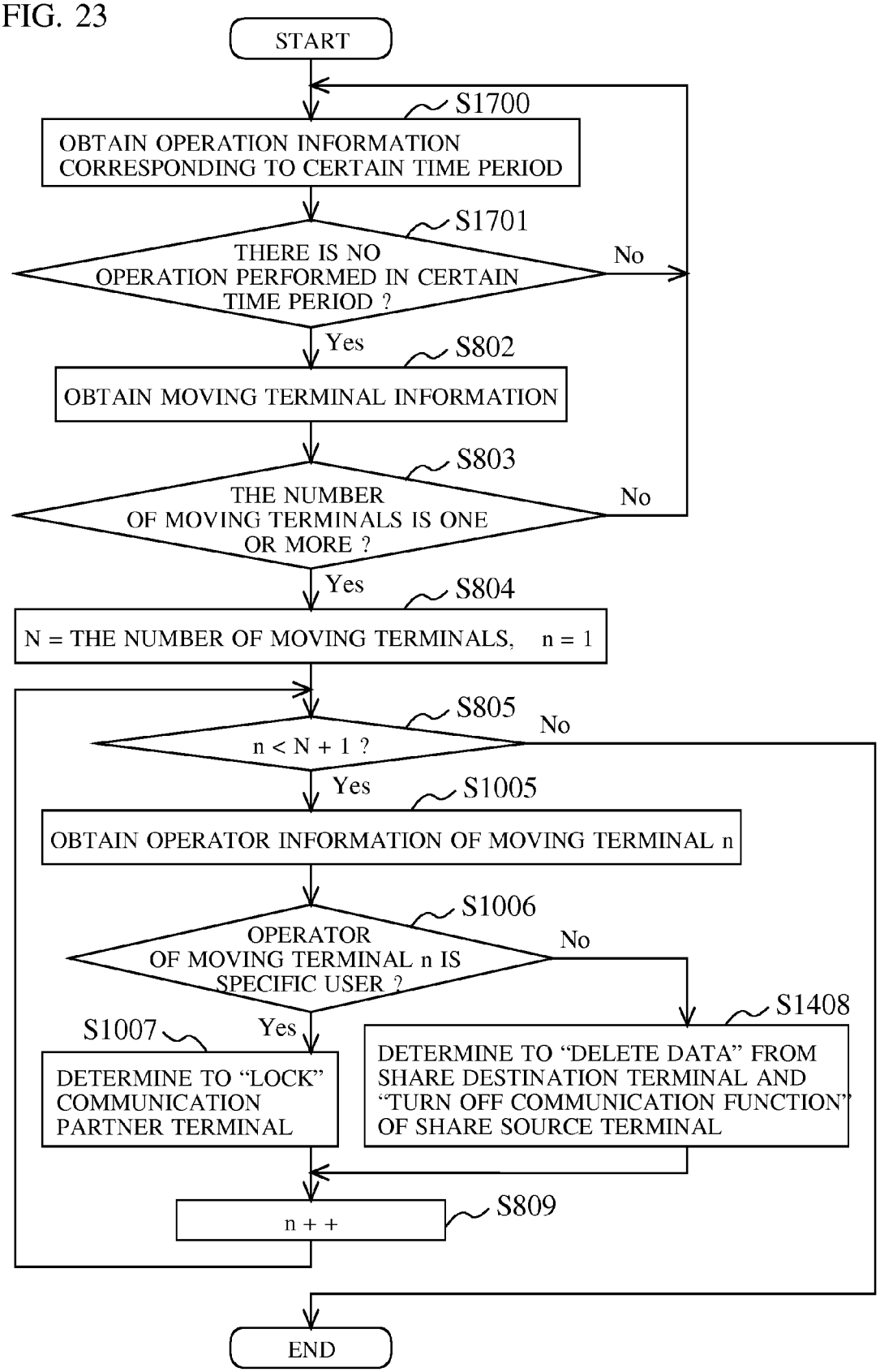

START
S1700
OBTAIN OPERATION INFORMATION CORRESPONDING TO CERTAIN TIME PERIOD
S1701
THERE IS NO OPERATION PERFORMED IN CERTAIN TIME PERIOD ?
No
Yes
S802
OBTAIN MOVING TERMINAL INFORMATION
S803
THE NUMBER OF MOVING TERMINALS IS ONE OR MORE ?
No
Yes
S804
N = THE NUMBER OF MOVING TERMINALS, n = 1
S805
n < N + 1 ?
No
Yes
S1005
OBTAIN OPERATOR INFORMATION OF MOVING TERMINAL n
S1006
OPERATOR OF MOVING TERMINAL n IS SPECIFIC USER ?
No
Yes
S1007
DETERMINE TO "LOCK" COMMUNICATION PARTNER TERMINAL
S1408
DETERMINE TO "DELETE DATA" FROM SHARE DESTINATION TERMINAL AND "TURN OFF COMMUNICATION FUNCTION" OF SHARE SOURCE TERMINAL
n + +
S809
END

FIG. 24

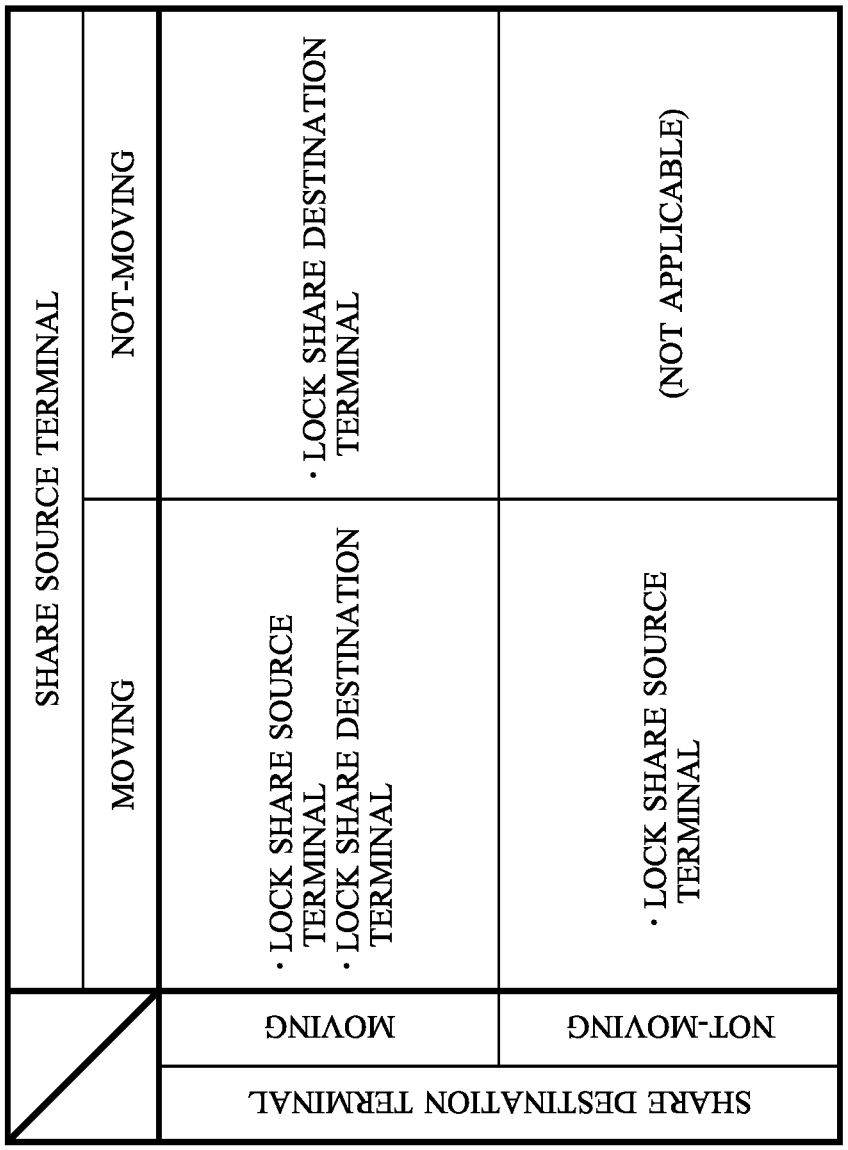

SHARE SOURCE TERMINAL
MOVING
NOT-MOVING
SHARE DESTINATION TERMINAL
MOVING
NOT-MOVING
· LOCK SHARE SOURCE TERMINAL
· LOCK SHARE DESTINATION TERMINAL
· LOCK SHARE DESTINATION TERMINAL
· LOCK SHARE SOURCE TERMINAL
(NOT APPLICABLE)

FIG. 25

SHARE SOURCE TERMINAL \ SHARE DESTINATION TERMINAL			MOVING		NOT-MOVING
			SPECIFIC USER	NON-SPECIFIC USER	
MOVING	SPECIFIC USER		· LOCK SHARE SOURCE TERMINAL · LOCK SHARE DESTINATION TERMINAL	· LOCK SHARE DESTINATION TERMINAL	· LOCK SHARE DESTINATION TERMINAL
	NON-SPECIFIC USER		· LOCK SHARE SOURCE TERMINAL	· LOCK SHARE SOURCE TERMINAL · LOCK SHARE DESTINATION TERMINAL	· LOCK SHARE SOURCE TERMINAL
NOT-MOVING			· LOCK SHARE SOURCE TERMINAL	· LOCK SHARE DESTINATION TERMINAL	(NOT APPLICABLE)

FIG. 26

		SHARE SOURCE TERMINAL	
		MOVING	NOT-MOVING
SHARE DESTINATION TERMINAL	MOVING	· LOCK SHARE SOURCE TERMINAL · TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL	· TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL
	NOT-MOVING	· LOCK SHARE SOURCE TERMINAL	(NOT APPLICABLE)

FIG. 27

SHARE DESTINATION TERMINAL		SHARE SOURCE TERMINAL		
		MOVING		NOT-MOVING
		SPECIFIC USER	NON-SPECIFIC USER	
MOVING	SPECIFIC USER	· LOCK SHARE SOURCE TERMINAL · LOCK SHARE DESTINATION TERMINAL	· LOCK SHARE SOURCE TERMINAL · TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL	· LOCK SHARE SOURCE TERMINAL
	NON-SPECIFIC USER	· LOCK SHARE DESTINATION TERMINAL · TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL	· TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL	· TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL
NOT-MOVING		· LOCK SHARE DESTINATION TERMINAL	· TURN OFF COMMUNICATION FUNCTION OF SHARE SOURCE TERMINAL · DELETE SHARED DATA FROM SHARE DESTINATION TERMINAL	(NOT APPLICABLE)

CONTROL SYSTEM AND SECURITY CONTROL METHOD

TECHNICAL FIELD

The present invention relates to a security control method for controlling, when a plurality of terminals share data therebetween, security functions of terminals in accordance with various states of the terminals, and relates to a control system which performs the method.

BACKGROUND ART

In recent years, more people own a plurality of information communication terminals that can execute applications, such as desktop personal computer (hereinafter, referred to as PC), notebook PC, tablet PC, PDA (personal digital assistant), mobile phone, smartphone, and the like, and use a plurality of information communication terminals differently in accordance with situations. Such information communication terminals are provided with functions to share necessary data when they are used in accordance with situations.

Data handled by smartphones often includes personal information. For example, there are many people who visit shopping sites by using browsers and input personal information such as address, credit card number, and the like. Access history and bookmark information made while a person uses a browser are privacy-related information, and thus, he or she may not want such information to be viewed by others. Thus, when data including such information is shared among information communication terminals, utmost attention need to be paid in order to prevent such information from leaking and being misused. Conceivable cases include a case where an information communication terminal not being used by its user is taken away by a third party while data is being shared, a case where information in the information communication terminal is viewed by a third party without permission, and the like.

In order to prevent above cases, a conventional technology has suggested a mobile communication terminal provided with means for performing, when the information communication terminal performs wireless communication with another information communication terminal, a predetermined security function, in accordance with a communication state of the wireless communication and the distance between the terminal itself and its communication partner terminal (for example, see Patent Literature 1).

CITATION LIST

Patent Literature

[PTL 1] Japanese Patent No. 4413709

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

However, a conventional configuration described in Patent Literature 1 above has the following problems.

The above mobile communication terminal performs a security function only in accordance with the communication state and the distance. Therefore, when communication is performed between terminals which share such highly-confidential data including personal information, flexible control based on features of each terminal that holds data or uses data cannot be performed.

Therefore, an object of the present invention is to provide a security control method that allows flexible control of, when a plurality of terminals are to share data, the security functions of the terminals in accordance with various states of the terminals, and a control system that performs the security control method.

Solution to the Problems

The present invention is directed to a control system formed by at least two wireless terminals that share data. In order to attain the above object, in the control system of the present invention, a share source terminal which provides shared data includes a first moving state detecting section configured to detect whether the share source terminal itself is in a moving state and to notify a share destination terminal of a result of the detection, and the share destination terminal which uses shared data provided by the share source terminal includes: a second moving state detecting section configured to detect whether the share destination terminal itself is in a moving state; a moving terminal determining section configured to determine a moving terminal that is currently moving, based on the result of the detection notified of by the first moving state detecting section and a result detected by the second moving state detecting section; a security process determining section configured to determine a terminal on which to perform a security process and a content of the security process, in accordance with a specific condition and the moving terminal determined by the moving terminal determining section; and a security process executing section configured to perform the security process determined by the security process determining section.

The share destination terminal may further include an inter-terminal distance measuring section configured to measure an inter-terminal distance between the share source terminal and the share destination terminal, or an operation detecting section configured to detect presence or absence of a terminal operation onto the share destination terminal itself performed by an operator, and the security process determining section may use the inter-terminal distance or the presence or absence of the terminal operation as the specific condition. In this case, if at least one of the share source terminal and the share destination terminal includes an operator detecting section configured to detect an operator operating the at least one terminal itself, the security process determining section can use whether the operator detected by the operator detecting section is a specific user, as the specific condition.

As a typical security process, it is conceivable to perform the following process in the case where the inter-terminal distance is not smaller than a predetermined value or in the case where a terminal operation is not performed for a certain time period. Examples of the security process include a process of locking a moving terminal, a process of locking a not-moving terminal if the operator of the moving terminal is a specific user and of locking the moving terminal if the operator of the moving terminal is not the specific user, a process of deleting shared data held by the share destination terminal and stopping a communication function of the share source terminal if the moving terminal is the share destination terminal and of locking the share source terminal if the moving terminal is the share source terminal, and a process of locking a not-moving terminal if the operator of the moving terminal is the specific user and of deleting shared data held by the share destination terminal and of stopping the commu-

nication function of the share source terminal if the operator of the moving terminal is not the specific user.

Advantageous Effects of the Invention

According to the control system of the present invention, when a plurality of terminals are to share data, the security functions of the terminals can be flexibly controlled in accordance with various states of the respective terminals. Therefore, an illegal access by a third party can be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an example of a configuration of a communication system including an information communication terminal provided by the present invention.

FIG. **2** shows an example of a display screen **11** of a tablet PC **10** and a display screen **21** of a mobile phone **20**.

FIG. **3** shows internal configuration of a share source terminal **100** and a share destination terminal **110** forming a control system according to a first embodiment of the present invention.

FIG. **4**A shows an example of movement information A which is a detection result by a moving state detecting section **202**.

FIG. **4**B shows an example of movement information B which is a detection result by a moving state detecting section **302**.

FIG. **5** shows an example of moving terminal information generated by a moving terminal determining section **303**.

FIG. **6** shows an example of inter-terminal distance information generated by an inter-terminal distance measuring section **304**.

FIG. **7** is a flow chart showing an example of a process performed by the moving terminal determining section **303**.

FIG. **8** is a flow chart showing an example of a process performed by a security process determining section **305**.

FIG. **9** shows internal configurations of a share source terminal **900** and a share destination terminal **910** forming a control system according to a second embodiment of the present invention.

FIG. **10** is a flow chart showing an example of a process performed by a security process determining section **915**.

FIG. **11** shows internal configuration of a share source terminal **1100** and a share destination terminal **1110** forming a control system according to a third embodiment of the present invention.

FIG. **12** is a flow chart showing an example of a process performed by a security process determining section **1115**.

FIG. **13** shows internal configurations of a share source terminal **1300** and a share destination terminal **1310** forming a control system according to a fourth embodiment of the present invention.

FIG. **14** is a flow chart showing an example of a process performed by a security process determining section **1315**.

FIG. **15** shows internal configurations of the share source terminal **100** and a share destination terminal **1510** forming a control system according to a fifth embodiment of the present invention.

FIG. **16** shows an example of operation information detected by a touch sensor **1514**.

FIG. **17** is a flow chart showing an example of a process performed by a security process determining section **1515**.

FIG. **18** shows internal configurations of the share source terminal **900** and a share destination terminal **1810** forming a control system according to a sixth embodiment of the present invention.

FIG. **19** is a flow chart showing an example of a process performed by a security process determining section **1815**.

FIG. **20** shows internal configurations of the share source terminal **1100** and a share destination terminal **1110** forming a control system according to a seventh embodiment of the present invention.

FIG. **21** is a flow chart showing an example of a process performed by a security process determining section **2015**.

FIG. **22** shows internal configurations of the share source terminal **1300** and a share destination terminal **2210** forming a control system according to an eighth embodiment of the present invention.

FIG. **23** is a flow chart showing an example of a process performed by a security process determining section **2215**.

FIG. **24** shows a list of security processes performed by the control system according to the first and the fifth embodiments.

FIG. **25** shows a list of security processes performed by the control system according to the second and sixth embodiments.

FIG. **26** shows a list of security processes performed by the control system according to the third and seventh embodiments.

FIG. **27** shows a list of security processes performed by the control system according to the fourth and eighth embodiments.

DESCRIPTION OF EMBODIMENTS

Hereinafter, embodiments of the present invention will be described with reference to the drawings.

The present invention assumes a situation where, when a user switches an information communication terminal being used by the user, from a first terminal (hereinafter, referred to as share source terminal) to a second terminal (hereinafter referred to as share destination terminal), the user is going to continuously use the application having been used in the share source terminal, also in the share destination terminal. In such a situation, information (shared data) such as operation contents performed onto the application in the share source terminal is transmitted to the share destination terminal. As a result, the same information is shared by the two terminals. Accordingly, the operation contents and the like of the application that the user had been using in the share source terminal before the terminal was switched is reproduced and displayed on the screen of the share destination terminal.

The present invention is characterized in that, during this terminal switching process, a target terminal on which to perform a security process is switched, in accordance with the distance between the involved terminals, and information regarding operation states, moving states, and operators of the respective terminals.

FIG. **1** shows an example of a configuration of a communication system including an information communication terminal provided by the present invention. In the example of FIG. **1**, one user owns a plurality of information communication terminals, that is, a tablet PC **10**, a mobile phone **20**, and a notebook PC **30**, which are connectable to a network **40**. The user uses these information communication terminals differently in accordance with situations. For example, it is conceivable that when the user has come home while operating the mobile phone **20**, the user switches the information communication terminal from the mobile phone **20** to the tablet PC **10** or the notebook PC **30** to continue the operation on a larger screen.

An example of display screens of the tablet PC **10** and the mobile phone **20** when internet news is being viewed is shown

in FIG. **2**. FIG. **2** shows an example of a display screen **11** of the tablet PC **10** and a display screen **21** of the mobile phone **20**.

The tablet PC **10** and the mobile phone **20** of the present embodiment are each provided with a communication function for connecting to a network, and a part of a Web site obtained by the communication function is being displayed on each of the display screens **11** and **21**. It should be noted that switching from the mobile phone **20** to the tablet PC **10** may be performed in accordance with an instruction through a physical button **22** or a software key provided in the mobile phone **20** being a share source terminal, or may be automatically performed by detecting a predetermined status change.

With respect to the usage described above, the switching direction may be in the reverse, of course. That is, each of the information communication terminals such as the tablet PC **10**, the mobile phone **20**, and the notebook PC **30** can be either of a share source terminal which provides shared data or a share destination terminal which uses the shared data.

Therefore, in each embodiment of the present invention below, the type of each information communication terminal is not questioned, and configurations necessary for an information communication terminal to function as a share source terminal, configurations necessary for an information communication terminal to function as a share destination terminal, and processes performed between the share source terminal and the share destination terminal will be described in detail.

First Embodiment

FIG. **3** shows internal configurations of a share source terminal **100** and a share destination terminal **110** forming a control system according to a first embodiment of the present invention. The share source terminal **100** includes a moving state detecting section **202** and a terminal lock executing section **207**. The share destination terminal **110** includes a moving state detecting section **302**, a moving terminal determining section **303**, an inter-terminal distance measuring section **304**, a security process determining section **305**, a security process executing section **306**, and a terminal lock executing section **307**.

The moving state detecting section **202** determines whether the share source terminal **100** which includes the moving state detecting section **202** is currently in a state of moving, and notifies the moving terminal determining section **303** included in the share destination terminal **110**, of the determined result as movement information A, via a communication interface (not shown). As means for detecting the movement information, various well-known technologies such as technologies for estimating a movement amount using an acceleration sensor, and detection technologies using GPS (Global Positioning System) can be used. Further, for notification of movement information, various well-known technologies such as wireless communication through a wireless LAN, Bluetooth (registered trademark), ZigBee/IEEE 802.15.4, and the like, and wired communication through a wired LAN and the like can be used.

FIG. **4**A shows an example of the movement information A which is a detection result by the moving state detecting section **202**. The movement information A is composed of time **400** and terminal state **401**. The time **400** is information indicating time at which the moving state detecting section **202** periodically detects the terminal state **401**. The terminal state **401** is information indicating whether the share source terminal **100** is in a moving state or in a stationary state. The movement information A illustrated in FIG. **4**A shows that at times 30 ms, 60 ms, 90 ms, 120 ms, 150 ms, and 180 ms, the share source terminal **100** was stationary, stationary, moving, moving, stationary, and stationary, respectively. Every time the moving state of the terminal is determined at the latest detection time, the moving terminal determining section **303** is notified of the movement information A comprising a set of the time **400** of that time point and its corresponding terminal state **401**.

The terminal lock executing section **207** performs a process of locking the share source terminal **100**, based on a notification received via a communication interface (not shown) from the security process executing section **306** included in the share destination terminal **110**. Locking the terminal here is an example of security processes applied to the present invention, and other security processes may be applied to the present invention.

The moving state detecting section **302** detects a moving state of the share destination terminal **110** which includes the moving state detecting section **302**, and notifies the moving terminal determining section **303** of the detection result, as movement information B. Also as means for detecting the movement information used in the moving state detecting section **302**, various well-known technologies can be used as in the case of the moving state detecting section **202**.

FIG. **4**B shows an example of the movement information B which is a determination result by the moving state detecting section **302**. The movement information B is composed of time **402** and terminal state **403**. The time **402** is information indicating time at which the moving state detecting section **302** periodically detects the terminal state **403**, and is synchronized with the time **400** of the movement information A. The terminal state **403** is information indicating whether the share destination terminal **110** is in a moving state or a stationary state. The movement information B illustrated in FIG. **4**B shows that at times 30 ms, 60 ms, 90 ms, 120 ms, 150 ms and 180 ms, the share destination terminal **110** was stationary, stationary, stationary, moving, moving, and moving, respectively. Every time the moving state of the terminal is determined in the latest detection time, the moving terminal determining section **303** is notified of the movement information B comprising a set of the time **402** of that time point and its corresponding terminal state **403**.

The moving terminal determining section **303** determines a moving terminal, based on the movement information A notified of via a communication interface by the moving state detecting section **202** and the movement information B notified of by the moving state detecting section **302**, generates information (hereinafter, referred to as moving terminal information) regarding the determined moving terminal, and notifies the security process determining section **305** of the generated information.

FIG. **5** shows an example of the moving terminal information generated by the moving terminal determining section **303**. This moving terminal information is composed of time **500**, the number of moving terminals **502**, and moving terminal type **503**. The time **500** is information indicating time at which the moving terminal determining section **303** determined the number of moving terminals **502** and the moving terminal type **503**, and corresponds to the time **400** of the movement information A and the time **402** of the movement information B. The number of moving terminals **502** is information indicating the number of moving terminals. The moving terminal type **503** is information showing which of the share source terminal **100** and the share destination terminal **110** each moving terminal is. The moving terminal type **503** is recorded by the number corresponding to the value indicated by the number of moving terminals **502**. The moving

terminal information illustrated in FIG. **5** shows that at times 30 ms, 60 ms, 90 ms, 120 ms, 150 ms, and 180 ms, the number of moving terminals was 0, 0, 1, 2, 1, and 1, respectively, and that the types of the moving terminals at those times were no moving terminal, no moving terminal, share source terminal only, share source terminal and share destination terminal, share destination terminal only, and share destination terminal only, respectively. It should be noted that a specific determination method for determining a moving terminal will be described later with reference to FIG. **7**.

The inter-terminal distance measuring section **304** measures the distance between the share source terminal **100** and the share destination terminal **110**, generates information (hereinafter, referred to as inter-terminal distance information) regarding the measured inter-terminal distance, and notifies the security process determining section **305** of the generated information. As means for detecting the distance between terminals, various well-known technologies, such as technology for estimating an inter-terminal distance using a camera and detection technologies using GPS, can be used.

FIG. **6** shows an example of inter-terminal distance information generated by the inter-terminal distance measuring section **304**. The inter-terminal distance information is composed of time **700** and inter-terminal distance **701**. The time **700** is information indicating time at which the inter-terminal distance measuring section **304** periodically measures the inter-terminal distance **701**, and is synchronized with the time **400** of the movement information A and the time **402** of the movement information B. The inter-terminal distance **701** is information indicating a physical distance between the share source terminal **100** and the share destination terminal **110**, measured by the inter-terminal distance measuring section **304**. The inter-terminal distance information illustrated in FIG. **6** shows that at times 30 ms, 60 ms, 90 ms, 120 ms, 150 ms, and 180 ms, the distance between the terminals was 30 cm, 30 cm, 180 cm, 280 cm, 550 cm, and 800 cm, respectively. Every time the distance between the terminals is determined in the latest detection time, the security process determining section **305** is notified of the inter-terminal distance information comprising a set of the time **700** of that time point and its corresponding inter-terminal distance **701**.

The security process determining section **305** determines a terminal on which to perform a security process, based on the moving terminal information notified of by the moving terminal determining section **303** and the inter-terminal distance information notified of by the inter-terminal distance measuring section **304**. The security process performed in the first embodiment is locking a terminal. The security process determining section **305** notifies the security process executing section **306** of the terminal on which the security process determining section **305** has determined to perform the security process. A specific terminal determination method will be described later with reference to FIG. **8**.

When the security process executing section **306** is notified of information regarding the terminal on which to perform the security process, by the security process determining section **305**, the security process executing section **306** notifies this terminal to perform the security process. For example, when the terminal on which to perform the security process is the share destination terminal **110**, the security process executing section **306** notifies the terminal lock executing section **307** to that effect, and when the terminal on which to perform the security process is the share source terminal **100**, the security process executing section **306** notifies the terminal lock executing section **207** to that effect via a communication interface. For performing notification to the terminal lock executing section **207**, various well-known technologies can be used as in the case of the moving state detecting section **202** described above.

The terminal lock executing section **307** performs a process of locking the share destination terminal **110** based on the notification from the security process executing section **306**. Locking the terminal here is also an example of security processes applied to the present invention, as mentioned regarding the terminal lock executing section **207**, and thus, another security process may be performed.

Next, with reference to FIG. **7**, the process of determining a moving terminal performed by the moving terminal determining section **303** will be described.

FIG. **7** is a flow chart showing an example of a moving terminal determining process performed by the moving terminal determining section **303** of the share destination terminal **110** according to the first embodiment of the present invention.

In the moving terminal determining process, the moving terminal determining section **303** first resets the moving terminal information (step S**700**). Next, the moving terminal determining section **303** obtains the latest movement information A from the moving state detecting section **202** (step S**701**), and confirms the terminal state **401** (step S**702**). Then, when the terminal state **401** is "moving" (step S**702**, Yes), the moving terminal determining section **303** increments by one the number of moving terminals **502** of the moving terminal information (step S**703**), and adds "share source terminal" to the moving terminal type **503** (step S**704**). On the other hand, when the terminal state **401** is "stationary" (step S**702**, No), the moving terminal determining section **303** does not perform any process.

When having completed the process regarding the movement information A, the moving terminal determining section **303** obtains, from the moving state detecting section **302**, the movement information B of the time **402** having the same value as that of the time **400** of the movement information A obtained in step S**701** (step S**705**), and confirms the terminal state **403** (step S**706**). Then, when the terminal state **403** is "moving" (step S**706**, Yes), the moving terminal determining section **303** increments by one the number of moving terminals **502** of the moving terminal information (step S**707**), and adds "share destination terminal" to the moving terminal type **503** (step S**708**). On the other hand, when the terminal state **403** is "stationary" (step S**706**, No), the moving terminal determining section **303** does not perform any process.

Through the above moving terminal determining process, the moving terminal information shown in FIG. **5** is generated.

Next, with reference to FIG. **8**, the process, performed by the security process determining section **305**, of determining a terminal whose function should be restricted will be described.

FIG. **8** is a flow chart showing an example of the process, performed by the security process determining section **305**, of determining a terminal on which to perform a security process according to the first embodiment of the present invention.

In the process of determining a terminal on which to perform the security process, the security process determining section **305** first obtains the latest inter-terminal distance information from the inter-terminal distance measuring section **304** (step S**800**), and determines whether the inter-terminal distance **701** is not smaller than a predetermined value (e.g., 300 cm) (step S**801**). When the inter-terminal distance **701** is not smaller than the predetermined value (step S**801**, Yes), the security process determining section **305** then

obtains, from the moving terminal determining section **303**, the moving terminal information corresponding to the time **500** having the same value as that of the time **700** of the inter-terminal distance information obtained in step S**800** (step S**802**), and confirms the number of moving terminals **502** (step S**803**). As a result of this confirmation, when the number of moving terminals **502** is one or more (step S**803**, Yes), the security process determining section **305** determines security processes to be performed for the one or more moving terminals, in the following manner.

As an initial setting, defining the number of moving terminals **502** as N and the nth terminal included in the moving terminal type **503** as a moving terminal n, the security process determining section **305** sets the initial value n to 1 (step S**804**). With respect to each moving terminal n determined as existing in step S**803**, the security process determining section **305** confirms the terminal type (step S**806**). Then, when the moving terminal n is the share destination terminal **110** (step S**806**, Yes), the security process determining section **305** determines to lock the share destination terminal **110** irrespective of whether it is moving or not (step S**807**), and when the moving terminal n is the share source terminal **100** (step S**806**, No), the security process determining section **305** determines to lock the share source terminal **100** irrespective of whether it is moving or not (step S**808**). It should be noted that the process for all the moving terminals listed in the moving terminal type **503** is performed by repeating the determination whether n<N+1 (step S**805**), and increment of n by one (step S**809**). A list of security processes performed by the control system according to the first embodiment is shown in FIG. **24**.

As described above, in the control system according to the first embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of a security function (locking a terminal) can be flexibly controlled in accordance with the moving state of each terminal.

Second Embodiment

FIG. **9** shows internal configurations of a share source terminal **900** and a share destination terminal **910** forming a control system according to a second embodiment of the present invention. The share source terminal **900** includes the moving state detecting section **202**, the terminal lock executing section **207**, and a fingerprint authentication sensor **901**. The share destination terminal **910** includes the moving state detecting section **302**, the moving terminal determining section **303**, the inter-terminal distance measuring section **304**, a security process determining section **915**, the security process executing section **306**, the terminal lock executing section **307**, and a fingerprint authentication sensor **911**.

The control system according to the second embodiment shown in FIG. **9** is different from that according to the first embodiment, in the configurations of the fingerprint authentication sensor **901** included in the share source terminal **900**, and the fingerprint authentication sensor **911** and the security process determining section **915** included in the share destination terminal **910**. Since the other configurations in the control system according to the second embodiment are the same as those of the first embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the fingerprint authentication sensor **901**, the fingerprint authentication sensor **911**, and the security process determining section **915** will be described.

The fingerprint authentication sensor **901** determines the operator operating the share source terminal **900** which includes the fingerprint authentication sensor **901**, by his or her fingerprint, and notifies the security process determining section **915** included in the share destination terminal **910** via a communication interface (not shown), of this determined result as operator information A. Further, the fingerprint authentication sensor **911** determines the operator operating the share destination terminal **910** which includes the fingerprint authentication sensor **911**, by his or her fingerprint, and notifies the security process determining section **915** of the determined result as operator information B. Each of the fingerprint authentication sensors **901** and **911** determines whether the detected operator's fingerprint is the fingerprint of a specific user set in advance, outputs operator information indicating whether the operator is the specific user or a user other than the specific user. It should be noted that the fingerprint authentication sensors **901** and **911** are an example of a configuration (operator detecting section) for detecting an operator to be applied to the present invention, and various well-known technologies other than this example can be used.

The security process determining section **915** determines a terminal on which to perform a security process, based on the operator information A notified of by the fingerprint authentication sensor **901**, the operator information B notified of by the fingerprint authentication sensor **911**, the moving terminal information notified of by the moving terminal determining section **303**, and the inter-terminal distance information notified of by the inter-terminal distance measuring section **304**. The security process performed in the second embodiment is locking a terminal. The security process determining section **915** notifies the security process executing section **306** of the terminal on which the security process determining section **915** has determined to perform the security process.

Next, with reference to FIG. **10**, the process, performed by the security process determining section **915**, of determining a terminal whose function should be restricted will be described.

FIG. **10** is a flow chart showing an example of a process, performed by the security process determining section **915**, of determining a terminal on which to perform a security process according to the second embodiment of the present invention. It should be noted that, in FIG. **10**, steps that perform the same processes as those in FIG. **8** are denoted by the same reference characters and description thereof will be omitted.

As a result of confirming the moving terminal information, when the number of moving terminals **502** is one or more (step S**803**, Yes), the security process determining section **915** obtains, for each moving terminal n determined as existing in step S**803**, the operator information of the moving terminal n at the corresponding time **700** (step S**1005**). When the moving terminal n is the share source terminal **900**, the security process determining section **915** obtains the operator information A from the fingerprint authentication sensor **901**. When the moving terminal n is the share destination terminal **910**, the security process determining section **915** obtains the operator information B from the fingerprint authentication sensor **911**. Then, when the operator of the moving terminal n is its corresponding specific user (step S**1006**, Yes), the security process determining section **915** determines that the terminal is being moved by the specific user, and determines to lock its communication partner terminal irrespective of whether it is moving or not (step S**1007**). Here, the communication partner terminal (not-moving terminal) means the share destination terminal **910** when the moving terminal n is the share source terminal **900**, and means the share source terminal **900** when the moving terminal n is the share desti-

nation terminal **910**. On the other hand, when the operator of the moving terminal n is not the specific user (step **S1006**, No), the security process determining section **915** determines that the terminal is being moved by a third party, and determines to lock the moving terminal n irrespective of whether it is moving or not (step **S1008**). A list of security processes performed by the control system according to the second embodiment is shown in FIG. **25**.

As described above, in the control system according to the second embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of a security function (locking a terminal) can be flexibly controlled in accordance with the moving state of each terminal and the operator of the terminal.

Third Embodiment

FIG. **11** shows internal configurations of a share source terminal **1100** and a share destination terminal **1110** forming a control system according to a third embodiment of the present invention. The share source terminal **1100** includes the moving state detecting section **202**, the terminal lock executing section **207**, and a communication control section **1107**. The share destination terminal **1110** includes the moving state detecting section **302**, the moving terminal determining section **303**, the inter-terminal distance measuring section **304**, a security process determining section **1115**, the security process executing section **306**, and a data deletion executing section **1117**.

The control system according to the third embodiment shown in FIG. **11** is different from that according to the first embodiment, in the configurations of the communication control section **1107** included in the share source terminal **1100**, and the security process determining section **1115** and the data deletion executing section **1117** included in the share destination terminal **1110**. Since the other configurations in the control system according to the third embodiment are the same as those of the first embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the communication control section **1107**, the security process determining section **1115**, and the data deletion executing section **1117** will be described.

The security process determining section **1115** determines a terminal and a function on which to perform a security process, based on the moving terminal information notified of by the moving terminal determining section **303**, and the inter-terminal distance information notified of by the inter-terminal distance measuring section **304**. The security process performed in the third embodiment includes deletion of data, turning off a communication function, and locking a terminal. The security process determining section **1115** notifies the security process executing section **306** of the terminal and the function on which the security process determining section **1115** has determined to perform the security process.

Based on the notification from the security process executing section **306**, the data deletion executing section **1117** performs a process of deleting data that the share destination terminal **1110** shares with the share source terminal **1100**. Deletion of data here is an example of security processes applied to the present invention, and another security process may be performed.

The communication control section **1107** performs a process of restricting communication performed by the share source terminal **1100**, that is, a process of turning off the communication function thereof, based on the notification received via a communication interface from the security process executing section **306** which is included in the share destination terminal **1110**. Turning off a communication function is an example of security processes applied to the present invention, and another security process may be performed.

Next, with reference to FIG. **12**, the process, performed by the security process determining section **1115**, of determining a terminal whose function should be restricted will be described.

FIG. **12** is a flow chart showing an example of a process, performed by the security process determining section **1115**, of determining a terminal and a function on which to perform a security process according to the third embodiment of the present invention. In FIG. **12**, steps that perform the same processes as those in FIG. **8** are denoted by the same reference characters and description thereof will be omitted.

With respect to each moving terminal n determined as existing in step **S803**, the security process determining section **1115** confirms the terminal type (step **S806**). Then, when the moving terminal n is the share destination terminal **1110** (step **S806**, Yes), the security process determining section **1115** determines to turn off the communication function of the share source terminal **1100** irrespective of whether it is moving or not, and to delete shared data from the share destination terminal **1110** (step **S1207**). When the moving terminal n is the share source terminal **1100** (step **S806**, No), the security process determining section **1115** determines to lock the share source terminal **1100** (step **S808**). A list of security processes performed by the control system according to the third embodiment is shown in FIG. **26**.

As described above, in the control system according to the third embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of security functions (turning off a communication function, deletion of data, and locking a terminal) can be flexibly controlled in accordance with the moving state of each terminal.

Fourth Embodiment

FIG. **13** shows internal configurations of a share source terminal **1300** and a share destination terminal **1310** forming a control system according to a fourth embodiment of the present invention. The share source terminal **1300** includes the moving state detecting section **202**, the terminal lock executing section **207**, the communication control section **1107**, and the fingerprint authentication sensor **901**. The share destination terminal **1310** includes the moving state detecting section **302**, the moving terminal determining section **303**, the inter-terminal distance measuring section **304**, a security process determining section **1315**, the security process executing section **306**, the terminal lock executing section **307**, the data deletion executing section **1117**, and the fingerprint authentication sensor **911**.

The control system according to the fourth embodiment shown in FIG. **13** is different from that according to the second embodiment, in the configurations of the communication control section **1107** included in the share source terminal **1300** and the security process determining section **1315** and the data deletion executing section **1117** included in the share destination terminal **1310**. Since the other configurations in the control system according to the fourth embodiment are the same as those of the second embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the communication control section **1107**, the security process determining section **1315**, and the data deletion executing section **1117** will be described.

The security process determining section **1315** determines a terminal and a function on which to perform a security process, based on the operator information A notified of by the fingerprint authentication sensor **901**, the operator information B notified of by the fingerprint authentication sensor **911**, the moving terminal information notified of by the moving terminal determining section **303**, and the inter-terminal distance information notified of by the inter-terminal distance measuring section **304**. The security process performed in the fourth embodiment includes deletion of data, turning off a communication function, and locking a terminal. The security process determining section **1315** notifies the security process executing section **306** of the terminal and the function on which the security process determining section **1315** has determined to perform the security process.

Based on the notification from the security process executing section **306**, the data deletion executing section **1117** performs a process of deleting data that the share destination terminal **1310** shares with the share source terminal **1300**. Deletion of data here is an example of security processes applied to the present invention, and another security process may be performed.

The communication control section **1107** performs a process of restricting communication performed by the share source terminal **1300**, that is a process of turning off the communication function thereof, based on the notification received via a communication interface from the security process executing section **306** included in the share destination terminal **1310**. Turning off a communication function is an example of security processes applied to the present invention, and another security process may be performed.

Next, with reference to FIG. **14**, the process, performed by the security process determining section **1315**, of determining a terminal whose function should be restricted will be described.

FIG. **14** is a flow chart showing an example of a process, performed by the security process determining section **1315**, of determining a terminal and a function on which to perform a security process according to the fourth embodiment of the present invention. In FIG. **14**, steps that perform the same processes as those in FIG. **8** and FIG. **10** are denoted by the same reference characters and description thereof will be omitted.

Based on the operator information A and B obtained from the fingerprint authentication sensors **901** and **911**, when having determined that the operator of the moving terminal n is its corresponding specific user (step S**1006**, Yes), the security process determining section **915** determines that the terminal is being moved by the specific user, and determines to lock its communication partner terminal irrespective of whether it is moving or not (step S**1107**). On the other hand, when having determined that the operator of the moving terminal n is not the specific user based on the operator information A and B (step S**1006**, No), the security process determining section **915** determines to turn off the communication function of the share source terminal **1300** irrespective of whether it is moving or not and to delete shared data from the share destination terminal **1310** (step S**1408**). A list of security processes performed by the control system according to the fourth embodiment is shown in FIG. **27**.

As described above, in the control system according to the fourth embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of security functions (turning off a communication function, deletion of data, and locking a terminal) can be flexibly controlled in accordance with the moving state of each terminal and the operator of the terminal.

Fifth Embodiment

FIG. **15** shows internal configurations of the share source terminal **100** and a share destination terminal **1510** forming a control system according to a fifth embodiment of the present invention. The share source terminal **100** includes the moving state detecting section **202** and the terminal lock executing section **207**. The share destination terminal **1510** includes the moving state detecting section **302**, the moving terminal determining section **303**, a touch sensor **1514**, a security process determining section **1515**, the security process executing section **306**, and the terminal lock executing section **307**.

The control system according to the fifth embodiment shown in FIG. **15** is different from that according to the first embodiment, in the configurations of the touch sensor **1514** and the security process determining section **1515** included in the share destination terminal **1510**. Since the other configurations in the control system according to the fifth embodiment are the same as those of the first embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the touch sensor **1514** and the security process determining section **1515** will be described.

The touch sensor **1514** detects (presence of absence of) an operation performed onto the share destination terminal **1510**, and notifies the security process determining section **1515** of the detected result as operation information. The touch sensor **1514** is an example of a configuration (operation detecting section) for detecting an operation applied to the present invention, and various well-known technologies other than this example can be used. Further, the touch sensor **1514** may be provided on the share source terminal **100** side, or may be provided in each of the share source terminal **100** and the share destination terminal **1510**.

FIG. **16** shows an example of operation information detected by the touch sensor **1514**. The operation information is composed of time **1600** and operation **1601**. The time **1600** is information indicating time at which the touch sensor **1514** detected the operation **1601**, and corresponds to the time **400** of the movement information A and the time **402** of the movement information B. The operation **1601** is information indicating whether there is an operation performed onto the share destination terminal **110**. The operation information illustrated in FIG. **16** shows that at times 30 ms, 60 ms, 90 ms, 120 ms, 150 ms, and 180 ms, the operation onto the terminal was performed, not performed, not performed, not performed, not performed, and not performed, respectively.

The security process determining section **1515** determines a terminal on which to perform a security process, based on the moving terminal information notified of by the moving terminal determining section **303** and the operation information notified of by the touch sensor **1514**. The security process performed in the fifth embodiment is locking a terminal. The security process determining section **1515** notifies the security process executing section **306** of the terminal on which the security process determining section **1515** has determined to perform the security process.

Next, with reference to FIG. **17**, the process, performed by the security process determining section **1515**, of determining a terminal whose function should be restricted will be described.

FIG. **17** is a flow chart showing an example of a process, performed by the security process determining section **1515**, of determining a terminal on which to perform a security process according to the fifth embodiment of the present invention. It should be noted that, in FIG. **17**, steps that

perform the same processes as those in FIG. **8** are denoted by the same reference characters and description thereof will be omitted.

In the process of determining a terminal on which to perform the security process of the fifth embodiment, the security process determining section **305** obtains operation information corresponding to a certain time period (e.g., 90 ms) from the touch sensor **1514** (step S**1700**), and determines whether there is no operation performed onto the share destination terminal **1510** in the certain time period with reference to the operation **1601** (step S**1701**). Then, only when there is no operation performed onto the share destination terminal **1510** in the certain time period (step S**1701**, Yes), the security process determining section **1515** performs the process of determining a terminal based on steps S**802** to S**809** described in the first embodiment. A list of security processes performed by the control system according to the fifth embodiment is shown in FIG. **24**.

As described above, in the control system according to the fifth embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of a security function (locking a terminal) can be flexibly controlled in accordance with the operation state of each terminal and the moving state of the terminal.

Sixth Embodiment

FIG. **18** shows internal configurations of the share source terminal **900** and a share destination terminal **1810** forming a control system according to a sixth embodiment of the present invention. The share source terminal **900** includes the moving state detecting section **202**, the terminal lock executing section **207**, and the fingerprint authentication sensor **901**. The share destination terminal **1810** includes the moving state detecting section **302**, the moving terminal determining section **303**, the touch sensor **1514**, a security process determining section **1815**, the security process executing section **306**, the terminal lock executing section **307**, and the fingerprint authentication sensor **911**.

The control system according to the sixth embodiment shown in FIG. **18** is different from that according to the second embodiment, in the configurations of the touch sensor **1514** and the security process determining section **1815** included in the share destination terminal **1810**. Since the other configurations in the control system according to the sixth embodiment are the same as those in the second embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the touch sensor **1514** and the security process determining section **1815** will be described.

The touch sensor **1514** has the same configuration as that described in the fifth embodiment, detects an operation performed onto the share destination terminal **1810**, and notifies the security process determining section **1815** of the detected result as operation information (FIG. **16**).

The security process determining section **1815** determines a terminal on which to perform a security process, based on the operator information A notified of by the fingerprint authentication sensor **901**, the operator information B notified of by the fingerprint authentication sensor **911**, the moving terminal information notified of by the moving terminal determining section **303**, and the operation information notified of by the touch sensor **1514**. The security process performed in the sixth embodiment is locking a terminal. The security process determining section **1815** notifies the security process executing section **306** of the terminal on which the security process determining section **1815** has determined to perform the security process.

Next, with reference to FIG. **19**, the process, performed by the security process determining section **1815**, of determining a terminal whose function should be restricted will be described.

FIG. **19** is a flow chart showing an example of a process, performed by the security process determining section **1815**, of determining a terminal on which to perform a security process according to the sixth embodiment of the present invention. It should be noted that, in FIG. **19**, step that perform the same processes as those in FIG. **10** are denoted by the reference characters and description thereof will be omitted.

In the process of determining a terminal on which to perform the security process of the sixth embodiment, the security process determining section **305** obtains operation information corresponding to a certain time period from the touch sensor **1514** (step S**1700**), and determines whether there is no operation performed onto the share destination terminal **1510** in the certain time period with reference to the operation **1601** (step S**1701**). Then, only when there is no operation performed onto the share destination terminal **1810** in the certain time period (step S**1701**, Yes), the security process determining section **1815** performs the process of determining a terminal based on steps S**802** to S**805**, S**1005** to S**1008**, and S**809** described in the second embodiment. A list of security processes performed by the control system according to the sixth embodiment is shown in FIG. **25**.

As described above, in the control system according to the sixth embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of a security function (locking a terminal) can be flexibly controlled in accordance with the operation state of each terminal, the moving state of the terminal, and the operator of the terminal.

Seventh Embodiment

FIG. **20** shows internal configurations of the share source terminal **1100** and a share destination terminal **2010** forming a control system according to a seventh embodiment of the present invention. The share source terminal **1100** includes the moving state detecting section **202**, the terminal lock executing section **207**, and the communication control section **1107**. The share destination terminal **2010** includes the moving state detecting section **302**, the moving terminal determining section **303**, the touch sensor **1514**, a security process determining section **2015**, the security process executing section **306**, and the data deletion executing section **1117**.

The control system according to the seventh embodiment shown in FIG. **20** is different from that according to the third embodiment, in the configurations of the touch sensor **1514** and the security process determining section **2015** included in the share destination terminal **2010**. Since the other configurations in the control system according to the seventh embodiment are the same as those in the third embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the touch sensor **1514** and the security process determining section **2015** will be described.

The touch sensor **1514** has the same configuration as that described in the fifth embodiment, detects an operation performed onto the share destination terminal **2010**, and notifies the security process determining section **2015** of the detected result as operation information (FIG. **16**).

The security process determining section **2015** determines a terminal and a function on which to perform a security process, based on the moving terminal information notified of by the moving terminal determining section **303** and the operation information notified of by the touch sensor **1514**. The security process performed in the seventh embodiment includes deletion of data, turning off a communication function, and locking a terminal. The security process determining section **2015** notifies the security process executing section **306** of the terminal and the function on which the security process determining section **2015** has determined to perform the security process.

Next, with reference to FIG. **21**, the process, performed by the security process determining section **2015**, of determining a terminal whose function should be restricted will be described.

FIG. **21** is a flow chart showing an example of a process, performed by the security process determining section **2015**, of determining a terminal and a function on which to perform a security process according to the seventh embodiment of the present invention. It should be noted that, in FIG. **21**, steps that perform the same processes as those in FIG. **12** are denoted by the same reference characters and description thereof will be omitted.

In the process of determining a terminal and a function on which to perform the security process of the seventh embodiment, the security process determining section **2015** obtains operation information corresponding to a certain time period from the touch sensor **1514** (step S**1700**), and determines whether there is no operation performed onto the share destination terminal **2010** in the certain time period with reference to the operation **1601** (step S**1701**). Then, only when there is no operation performed onto the share destination terminal **2010** in the certain time period, the security process determining section **2015** performs the process of determining a terminal and a function based on steps S**802** to S**806**, S**1207**, S**808**, and S**809** described in the third embodiment. A list of security processes performed by the control system according to the seventh embodiment is shown in FIG. **26**.

As described above, in the control system according to the seventh embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of security functions (turning off a communication function, deletion of data, and locking a terminal) can be flexibly controlled in accordance with the operation state of each terminal and the moving state of the terminal.

Eighth Embodiment

FIG. **22** shows internal configurations of the share source terminal **1300** and a share destination terminal **2210** forming a control system according to an eighth embodiment of the present invention. The share source terminal **1300** includes the moving state detecting section **202**, the terminal lock executing section **207**, the communication control section **1107**, and the fingerprint authentication sensor **901**. The share destination terminal **2210** includes the moving state detecting section **302**, the moving terminal determining section **303**, the touch sensor **1514**, a security process determining section **2215**, the security process executing section **306**, the terminal lock executing section **307**, the data deletion executing section **1117**, and the fingerprint authentication sensor **911**.

The control system according to the eighth embodiment shown in FIG. **22** is different from that according to the fourth embodiment, in the configurations of the touch sensor **1514** and the security process determining section **2215** included in the share destination terminal **2210**. Since the other configurations in the control system according to the eighth embodiment are the same as those of the fourth embodiment, they are denoted by the same reference characters, and description thereof will be omitted. Now, the touch sensor **1514** and the security process determining section **2215** will be described.

The touch sensor **1514** has the same configuration as that described in the fifth embodiment, detects an operation performed onto the share destination terminal **2210**, and notifies the security process determining section **2215** of the detected result as operation information (FIG. **16**).

The security process determining section **2215** determines a terminal and a function on which to perform a security process, based on the operator information A notified of by the fingerprint authentication sensor **901**, the operator information B notified of by the fingerprint authentication sensor **911**, the moving terminal information notified of by the moving terminal determining section **303**, and the operation information notified of by the touch sensor **1514**. The security process performed in the eighth embodiment includes deletion of data, turning off a communication function, and locking a terminal. The security process determining section **2215** notifies the security process executing section **306** of the terminal and the function on which the security process determining section **2215** has determined to perform the security process.

Next, with reference to FIG. **23**, the process, performed by the security process determining section **2215**, of determining a terminal whose function should be restricted will be described.

FIG. **23** is a flow chart showing an example of a process, performed by the security process determining section **2215**, of determining a terminal and a function on which to perform a security process according to the eighth embodiment of the present invention. It should be noted that, in FIG. **23**, step that perform the same processes as those in FIG. **14** are denoted by the same reference characters and description thereof will be omitted.

In the process of determining a terminal and a function on which to perform the security process of the eighth embodiment, the security process determining section **2215** obtains operation information corresponding to a certain time period from the touch sensor **1514** (step S**1700**), and determines whether there is no operation performed onto the share destination terminal **2210** in the certain time period with reference to the operation **1601** (step S**1701**). Then, only when there is no operation performed onto the share destination terminal **2210** in the certain time period (step S**1701**, Yes), the security process determining section **2215** performs the process of determining a terminal and a function based on steps S**802** to S**805**, S**1005** to S**1007**, S**1408**, and S**809** described in the fourth embodiment. A list of security processes performed by the control system according to the eighth embodiment is shown in FIG. **27**.

As described above, in the control system according to the eighth embodiment of the present invention, when data is shared among a plurality of information communication terminals, execution of security functions (turning off a communication function, deletion of data, and locking a terminal) can be flexibly controlled in accordance with the operation state of each terminal, the moving state of the terminal, and the operator of the terminal.

It should be noted that a part or the whole of the functional blocks of the share source terminal and the share destination terminal forming the control system of each embodiment of the present invention is realized by using hardware resources such as a central processing unit (CPU), a storage device (memory (ROM, RAM, etc.), a hard disk, etc.), and an input/

output device, and typically implemented as an IC being an integrated circuit (also referred to as LSI, system LSI, super LSI, ultra LSI, etc.). These functional blocks may be implemented in individual chips, or a part or the whole of them may be implemented in one chip.

Further, the method for circuit integration is not limited to the IC, and may be realized by a dedicated circuit or a general-purpose processor. An FPGA (Field Programmable Gate Array) that can be programmed after manufacture of the IC or a reconfigurable processor that allows connections and settings of the circuit cell in the IC to be reconfigured may be used.

Still further, in a case where another circuit integration technology (such as biotechnology) replacing the IC becomes available as a result of improvement of a semiconductor technology or emergence of another technology derived therefrom, the functional blocks may be, of course, integrated using the technology.

The security control performed by the control system according to each embodiment of the present invention may be realized by the CPU interpreting and executing predetermined program data capable of executing the processes of the security control stored in the storage device. In this case, the program data may be loaded onto the storage device via a storage medium such as a DVD-ROM, a flexible disk, or the like, or may be directly executed on the storage medium. Here, the storage medium includes: a semiconductor memory such as a ROM, a RAM, and a flash memory; a magnetic disk memory such as a flexible disk and a hard disk; an optical disk memory such as a DVD and a BD; and a memory card; and the like. Further, the storage medium is a notion including a communication medium such as a telephone line, a carrier path, and the like.

INDUSTRIAL APPLICABILITY

The control system of the present invention can be used in a communication system and the like that includes a plurality of information communication terminals. The control system of the present invention is particularly useful, for example, in the case where data is shared among a plurality of information communication terminals and it is desired to flexibly control execution of a security function.

DESCRIPTION OF THE REFERENCE CHARACTERS

10 tablet PC
11, **21** display screen
20 mobile phone
22 button
30 notebook PC
40 network
100, **900**, **1100**, **1300** share source terminal
110, **910**, **1110**, **1310**, **1510**, **1810**, **2010**, **2210** share destination terminal
202, **302** moving state detecting section
207, **307** terminal lock executing section
303 moving terminal determining section
304 inter-terminal distance measuring section
305, **915**, **1115**, **1315**, **1515**, **1815**, **2015**, **2215** security process determining section
306 security process executing section
901, **911** fingerprint authentication sensor
1107 communication control section
1117 data deletion executing section
1514 touch sensor

The invention claimed is:

1. A control system formed by at least two wireless terminals that share data, the control system comprising:
a first terminal and a second terminal, wherein
the first terminal includes a first processor and a first memory having stored thereon first executable instructions, which when executed by the first processor, cause the first terminal to function as:
a first moving state detecting section configured to detect whether the first terminal itself is in a moving state and to notify the second terminal of a result of the detection,
the second terminal includes a second processor and a second memory having stored thereon second executable instructions, which when executed by the second processor, cause the second terminal to function as:
a second moving state detecting section configured to detect whether the second terminal itself is in a moving state;
a moving terminal determining section configured to determine whether a moving terminal that is currently moving is the first terminal, the second terminal, or both of the first terminal and the second terminal, based on the result of the detection notified of by the first moving state detecting section and a result detected by the second moving state detecting section;
a security process determining section configured to determine a terminal on which to perform a security process and a content of the security process, in accordance with a specific condition and the moving terminal determined by the moving terminal determining section; and
a security process executing section configured to perform the security process determined by the security process determining section,
the specific condition is whether an operator is a specific user, and
the security process includes a process of locking a not-moving terminal if an operator of the moving terminal is the specific user.

2. The control system according to claim **1**, wherein
the second executable instructions, when executed by the second processor, cause the second terminal to further function as an inter-terminal distance measuring section configured to measure an inter-terminal distance between the first terminal and the second terminal, and
the inter-terminal distance is further used as the specific condition.

3. The control system according to claim **2**, wherein
at least one of the first executable instructions and the second executable instructions, when executed by at least one of the first processor and the second processor, cause at least one of the first terminal and the second terminal to further function as an operator detecting section configured to detect an operator operating the at least one terminal itself.

4. The control system according to claim **2**, wherein
the security process further includes a process of locking the moving terminal if the inter-terminal distance is not smaller than a predetermined value.

5. The control system according to claim **2**, wherein
the security process further includes a process of deleting shared data held by the second terminal and stopping a communication function of the first terminal if the moving terminal is the second terminal, and of locking the first terminal if the moving terminal is the first terminal,

in a case where the inter-terminal distance is not smaller than a predetermined value.

6. The control system according to claim **3**, wherein

the security process further includes a process of locking the moving terminal if the operator of the moving terminal is not the specific user in a case where the inter-terminal distance is not smaller than a predetermined value.

7. The control system according to claim **3**, wherein

the security process further includes a process of deleting shared data held by the second terminal and stopping a communication function of the first terminal if the operator of the moving terminal is not the specific user, in a case where the inter-terminal distance is not smaller than a predetermined value.

8. The control system according to claim **1**, wherein

the second executable instructions, when executed by the second processor, cause the second terminal to further function as an operation detecting section configured to detect presence or absence of a terminal operation onto the second terminal itself performed by an operator, and

the presence or absence of the terminal operation is further used as the specific condition.

9. The control system according to claim **8**, wherein

at least one of the first executable instructions and the second executable instructions, when executed by at least one of the first processor and the second processor, cause at least one of the first terminal and the second terminal to further function as an operator detecting section configured to detect an operator operating the at least one terminal itself.

10. The control system according to claim **8**, wherein

the security process further includes a process of locking the moving terminal in a case where the terminal operation is not performed for a certain time period.

11. The control system according to claim **8**, wherein

the security process further includes a process of deleting shared data held by the second terminal and stopping a communication function of the first terminal if the moving terminal is the second terminal, and of locking the first terminal if the moving terminal is the first terminal, in a case where the terminal operation is not performed for a certain time period.

12. The control system according to claim **9**, wherein

the security process further includes a process of locking the moving terminal if the operator of the moving terminal is not the specific user, in a case where the terminal operation is not performed for a certain time period.

13. The control system according to claim **9**, wherein

the security process further includes a process of deleting shared data held by the second terminal and stopping the communication function of the first terminal if the operator of the moving terminal is not the specific user, in a case where the terminal operation is not performed for a certain time period.

14. A wireless terminal included in a control system, the terminal comprising:

a processor; and

a non-transitory memory having stored thereon executable instructions, which when executed by the processor, cause the terminal to function as:

a moving state detecting section configured to detect whether the terminal itself is in a moving state;

a moving terminal determining section configured to determine whether a moving terminal that is currently moving is another terminal, the terminal, or both of the another terminal and the terminal, based on information, notified of by the another terminal, regarding whether the another terminal is in a moving state and a result detected by the moving state detecting section;

a security process determining section configured to determine a terminal on which to perform a security process and a content of the security process, in accordance with a specific condition and the moving terminal determined by the moving terminal determining section; and

a security process executing section configured to perform the security process determined by the security process determining section,

wherein the specific condition is whether an operator is a specific user, and

the security process includes a process of locking a not-moving terminal if an operator of the moving terminal is the specific user.

15. A security control method performed between a first terminal and a second terminal, the method comprising:

the first terminal detecting whether the first terminal itself is in a moving state and notifying the second terminal of a result of the detection; and

the second terminal

detecting whether the second terminal itself is in a moving state;

determining whether a moving terminal that is currently moving is the first terminal, the second terminal, or both of the first terminal and the second terminal, based on the result of the detection notified of by the first terminal and a result detected in the second terminal itself;

determining whether an operator is a specific user;

determining a terminal on which to perform a security process and a content of the security process, in accordance with the operator and the moving terminal that have been determined; and

performing the determined security process; wherein

in the security process, a not-moving terminal is locked if an operator of the moving terminal is the specific user.

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